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ONE of the most notable events last week is certainly the announcement of the gift, from Mr. George W. Vanderbilt, to the American Fine Arts Society, of one hundred thousand dollars, or, rather, of a deed of the gallery building adjoining and connected with the Society's building, which has cost that sum. Hardly less gratifying, and, in a certain sense, more useful, is the kindness with which Mr. Vanderbilt has, from the first, encouraged the undertaking of a society whose resources bore a very small proportion to its zeal, and which finds itself now, thanks to the generosity of the friends whom that very zeal has called around it, in possession of a building more spacious and well-equipped than its wildest dreams pictured to it at the outset, burdened with a debt which, although difficult enough for artists and poor students to carry, is yet small in comparison with the value of the property, and is likely to be lightened by assistance from outside as the great work of the Society becomes more widely known. In the extension of the reputation and usefulness of the Society, Mr. Vanderbilt's gift will have a most important part. The Art-Students' League, the Architectural League, and the Society of American Artists might each have existed by itself, might have held exhibitions, and provided for the instruction of its members; but the splendid exhibition-gallery, which forms the principal portion of Mr. Vanderbilt's building, will form a central point of fusion between them, which will be of great mutual benefit. In fact, the Fine Arts Society owes its existence to the conviction that the arts of form and color could not live happily separated, and the family which it has now succeeded in creating would have failed of much of its domestic bliss without this common meeting-place. Already, the gallery is engaged for various loan and other exhibitions, in which all the divisions of the Society participate, and every occasion on which the divisions of the Society meet each other and the public in their common parlor helps the public, the Society, and the professions which constitute the Society, to better understanding and higher regard.

THE Commissioners who have in charge the construction of the extension which may be seen, by the visitor to Boston, hiding coyly behind the Massachusetts State House, have come, according to their report, which has just been presented to the Legislature, to an extraordinary conclusion. It will be remembered that a couple of years ago, when the matter of increasing the accommodation in the State House was under discussion, we were so unfortunate as to incur some obloquy on account of our incautious suggestion that it might be possible to do away with the present State House. In fact, if we recollect rightly, we were so irreverent as to observe that the present State House consisted mainly of a wooden dome, badly rotted, and covered with a tin roof, which, as it was in constant danger from fire, and would fall down from decay before long any way, might be dispensed with, and the site, one of the most splendid in the United States, covered with a structure, arranged, perhaps, in some such way as the Palais de Justice at Brussels, or the Propylæa group at Athens, which would give ample accommodation for the State offices, in one of the noblest architectural compositions ever devised. For this audacious suggestion we received nothing but rebuke. We were informed that, although the present dome was leaky and rotten, it enclosed a wealth of sentiment and reminiscence which none but a Vandal would dream of laying his sacrilegious hands upon. By another critic we were told that the present façade of the State House, the dome included, was a work of such mysterious, but supreme loveliness that there was no possibility that any modern work could present equal interest, and that it was far better to let its tin rust off, and its spruce boards moulder gently into dust, than to try to replace it by anything else.

AS we, like most of our nearer relatives, were born in or near the shadow of the State House, and our boyish experience as a volunteer assistant in Governor Andrew's office during one of the most exciting periods of the Civil War had given us at least a notion of some of the reminiscences attached to the building, we could only account for our insensitiveness to the impropriety of our proposal by supposing it to be due to a natural brutishness of instinct, over which it would be well to cast a veil, and we forbore to discuss the subject further. Meanwhile, the Legislature, in deference to those exalted sentiments with which we had failed so painfully to sympathize, purchased, at great expense, a tract of land across the street in the rear of the sacred building, and there proceeded to erect an immense tail-piece, connected with the original structure by an iron bridge, but, as far as possible, concealed behind it. This tail-piece, which is of somewhat different material and style from the State House itself, is already approaching completion. Now, however, a strange phenomenon is to be observed. After a sacrifice by the State of millions of dollars, to say nothing of artistic effect and convenience of arrangement, for the sole object of keeping the ancient State House intact, we find the Commissioners of Construction of the new extension saying to the Legislature that "They feel it their duty to suggest whether the whole State House should not be made new. When the extension already authorized is completed, practically nothing of the old part will be left except Doric Hall, with its wings, halls, and the dome above it. It is some hundred years old. Its outer walls and wooden finish will not be in keeping with what, though called the addition, will really be five-sixths of the whole building. The dome is of wood, subject to the impairment of age, and should be iron. It is hardly possible that many years will pass, in any event, before this old and most conspicuous part, facing Beacon Street and the Common, will be made of equal quality with the rest. If so, it is to be considered whether the renovation cannot be made better and cheaper now, in conjunction with the work of the extension, than hereafter as a new enterprise." We must confess that on first reading this part of the Commissioner's report, after our astonishment had a little subsided, the old beast-like instinct rose up in us once more, and whispered, "Would it not have been better and cheaper still, instead of now making over the head to match the new tail, to have renovated the head, if necessary, first, and added the tail afterwards?"

A CORRESPONDENT sends us an advertisement of a competition for a public school building in a New Jersey town, adding some comments of his own as to his experience of the way in which such competitions are usually carried out. When we say that the programme requires competitors to furnish quarter-scale drawings, full specifications, and a "bonifide" estimate, by a responsible contractor, for the erection of the building complete, our older readers will need no information as to the probable future history of the affair; but the public, which occasionally wonders that architects of reputation in the profession never have anything to do with public school-houses, and educated teachers, who must sometimes think it strange that the planning of American school-houses almost never shows the faintest knowledge of the principles of school-planning which are accepted in all other civilized countries, may derive a new light from the suggestion that architects who possess any skill in their profession never throw away six hundred dollars' worth of work in the hope of securing a one-thousand-dollar commission, that such men usually understand too well the value of their own work to intrust the decision in regard to its merit to any but experts in whom they have confidence, and that, as experience has shown, by an overwhelming array of scandals, honest architects had better give public work a wide berth, such advertisements or circulars as the one sent us are, in most offices, thrown into the waste-basket without reading.

THAT there will be responses to such an invitation we do not, of course, deny. In such cases, it often happens that one of the committee, or board, has a *protégé*, in the shape of a draughtsman or engineer's clerk, or builder with some knowledge of drawing, who has been kept informed of the wishes of the board, and who, it need not be said, will be vigorously pushed for employment by his patron, even if, indeed, he is not already the choice of the board, who have instituted the "competition" for effect on the public, and to "get some other architects' ideas" for the benefit of their favorite. Besides competitors of this kind, plans will often be offered by builders' clerks, or by a builder himself, in the name of one of the nondescripts who make elevations for contractors, with, of course, the intention of throwing the contract for the erection of the structure into the hands of the builder, who can easily afford, out of his twenty-five or thirty per cent profit, to pay his servant for his work wages suited to his necessities. Where the importance of the projected building is sufficient to attract larger and more ravenous beasts of prey, the professional "public-building architect" may put in an appearance. This personage, although celebrated in the newspapers, and in the councils of politicians and legislators, is so little known to architects and the public generally that his portrait would hardly be recognized; so it will be sufficient to say that he is the man who bribes servants to commend his plans to the dignitaries by whom they are to be judged; who contrives that his buildings shall cost twice what they could be honestly built for; who levies blackmail on contractors, to be reimbursed, of course, out of the building funds, to the extent of many times the fees which would be paid to a skilful and honest architect; and who solaces himself for his condescension in doing nominally an architect's work at half an architect's charge by the rewards incident to conniving at the erection, by the contractors, of a mean, tottering sham, at a cost which would be extravagant for such solid construction and skilful plan as a true architect would secure.

IT is worth while to remember the principal methods of removing spots from paper, or other fabrics, which are summed up as follows in the *Württemberg Gewerbeblatt*: In general, the best solvent for spots, particularly those of unknown origin, is chloroform. Grease, pitch, tar, and wax are all dissolved by this substance, which has the additional advantage of evaporating very rapidly and completely, so that, if the place to be cleaned is first saturated with the chloroform, and then rubbed with clean cloths, the spot can generally be removed without leaving the sign, in the shape of a discolored border, which usually attends the use of other solvents. Spots of ordinary ink, or of any other compound of iron and tannic or gallic acid, resist chloroform or benzine, but are easily removed with an aqueous solution of oxalic acid, which should be applied hot, if possible, but not too strong. Stains of organic substances on white paper or cloth can often be removed by a solution of peroxide of hydrogen. This will bleach colored fabrics, but

does not injure white ones in the least, and is powerful enough to remove mildew stains from both paper and cloth. Next to these substances, benzine is probably the most useful detergent, as it is the best known. This can be used where the color of the material to be cleaned would be injured even by chloroform, and its action can be made still more gentle, where the fabric is very delicate, by mixing it with calcined magnesia into a paste, and spreading the paste on the spot, renewing it at intervals, as the benzine evaporates. The foreign body, as it is dissolved by the benzine, is absorbed by the magnesia powder, and at the conclusion of the operation the magnesia can easily be shaken off.

WE doubt if Chicago itself could furnish a more shining example of business enterprise than was recently to be observed, according to the German papers, in a small town of Russian Lithuania. In this town there lived, at one time, three insurance agents. There was not enough business for one, and two of the three became at length discouraged, and departed, leaving the field to the third, who appears to be a man of genius. Soon after the other two agents were safely out of the way mysterious placards were posted at night on the houses of the principal inhabitants announcing that before long, the whole town would be destroyed by a conflagration. Naturally, in view of this warning, those of the inhabitants who had not insured their houses made haste to do so, while those who were already insured increased their policies, so that the only agent in the place did a roaring business, at his own rates. Unfortunately, however, for him, some rival, or other suspicious person, hearing of the circumstances, set detectives to make an investigation, which resulted in the discovery that the ingenious agent had pasted up the placards himself. What was done to him to curb his enterprising spirit for the future we are not informed, but it is probable that the competing insurance agents took care to have him made an example of.

ONE often has to go from home to learn what is actually occurring there, and it is with gratitude that we, who entertain strong feelings on the trolley nuisance, discover in the *New York Evening Post* facts concerning the operations of the trolley in Boston which, we believe, have never been stated in the Boston newspapers, which maintain upon this head such an extraordinary silence. What amount of fire-loss should actually be charged to the trolley feed-wires, there is no means of determining, and so we cannot comment upon the matter, which, as architects, most properly concerns us. But the rights of common citizenship have a higher claim to attention, and, as we believe the owners of the trolley franchise and system in Boston consider everything before the private rights of citizens, we are glad to do what we can to draw attention to the manner in which the highest right, the right to live, suffers at the hands of these monopolists. From the sworn returns made to the Railway Commissioners, it appears that in the year 1892 there were killed by the cars of the West End Street Railway Company twenty-one persons, while two hundred and ninety others were injured, and we feel certain that the public press of Boston did not give to these three hundred casualties the publicity that such mishaps should have received. This death-loss is an increase of four hundred per cent over fatalities occasioned by the road during the year before the introduction of the electric-car; while the increase in the number of persons injured, as compared with the year 1888, is eighty-three per cent. The fatalities exceed the average number of those which have occurred during the past ten years at the twenty-two hundred grade-crossings in Massachusetts. Money is a poor return for a lost life, and, while the \$206,475 paid in 1892 (an increase over 1888 of \$167,817) as damages for this appalling number of casualties — while there are still many suits pending in the courts — are in some degree a compensation, yet this use of income can hardly be relished by the stockholders of a corporation whose accounts, but for certain extraneous and unusual accessions to income, would show, it is said, a deficit for the year just closed. Of all places in the country, Boston is the one where the trolley-car should have no place, although the system is installed there with admirable completeness, and the motor-men handle their huge death-dealing machines with wonderful skill and promptitude. The surface trolley-car and its overhead live wire ought to go.

ARCHITECT, OWNER & BUILDER BEFORE THE LAW.¹—XXVII.Window-head, Eighteenth Century, French. From *L'Art pour Tous*.

IN another case,² where the amount of the contract price is not stated, the referee found that the contract had been substantially performed, but that \$150 should be deducted from the contract price as recoupment to the owner for work defectively and insufficiently performed. The owner appealed, claiming that the amount of recoupment allowed by the referee showed that the contract had not been substantially performed; but the Court of Appeals held that "the amount allowed was not such as to show that the finding of substantial performance was unsustained by evidence."

In another New York case,³ the contractor for a house omitted to put cornices and centres as specified in some of the rooms, and left out the hair from the deafening mortar; and one of the stone lintels was imperfect; but the referee found that the contract had been substantially performed, and his decision was sustained.

In another instance,⁴ there were defects to the value of \$200 in certain plastering, the whole amount of the contract being \$11,700. The architect refused, on account of the defects, to give a final certificate, but the referee found that the contract had been substantially performed, and that the contract price should be paid, deducting \$200 for the defects. The fact that the architect's certificate was not produced, as required by the contract, the referee accounted for by finding that it had been unreasonably and improperly refused. The Court of Appeals sustained the decision of the referee, both as to the substantial performance of the contract and the right of the plaintiff to recover without the certificate of the architect, saying that "an unreasonable refusal on the part of the architect in such a case to give the certificate dispenses with its necessity."

On the other hand,⁵ where a man in New York agreed to strip the earth from a certain area of quarry land, and abandoned the job, leaving a strip from three to five feet wide unfinished, and when the owner asked him to come back and complete his work refused to do so, it was held that, the work having been intentionally left unperformed in a substantial particular, he could recover nothing for what he had done; and where a contract⁶ had been made to construct a building in a good, substantial and workmanlike manner, for a certain price, to be paid on the completion of the building, but the contractor built it so unskilfully that the walls were unsafe, and could not be made safe without rebuilding a considerable portion, estimated at two-fifths of the whole, and the owner refused to accept the work, it was held that the contractor could recover nothing.

In Minnesota,⁷ one Bixby agreed with Williamson to build a brick party-wall along the line between them, one-half to be on land of each; the cellar wall to be of stone, and the wall above to be of brick, 70 feet long, 28 feet high and 12 inches thick. The price was to be paid when the wall was completed. Bixby built the wall as agreed, except that at the front of the wall, above the basement, he put a stone pilaster 13 feet high, 16 inches wide and 10 inches deep. Williamson refused to pay for the wall, on the ground that it had not been built as agreed; and was sustained by the Supreme Court, which held that the building of the wall in this manner was not a compliance with the contract, so that Bixby could recover the price.

This seems like a rather hard case, especially as Bixby appears to have been equally interested with Williamson in the wall, and to have put the pilaster in front as a portion of a stone façade which he expected to join with Williamson in building at some future time; but all Courts, even where the milder theory of the law prevails, are disposed to look with disfavor on intentional variations from the agreement; and in another Minnesota case⁸ it was held that "The doctrine of 'substantial compliance with building contracts does not apply' when the omissions or departures from the contract are 'intentional, and so substantial as not to be capable of remedy, and that an allowance out of the contract price would not 'give the owner essentially what he contracted for.'" In this case, the builder, by fraudulent collusion with the superintendent, cheapened the building by omissions of work contracted for. The Court held that there could be no recovery, either for whole or part performance, although the owner had taken possession and was occupying the building.

In Kansas,⁹ as in Minnesota, the stricter view appears to be held. A man contracted to put down 2" x 6" sills for a sidewalk. He actually put down 2" x 4" sills of pine. In a suit to recover the value of what he had done, on *quantum meruit*, the Supreme Court held that he could recover nothing.

In Michigan,¹⁰ the law appears to be in a rather uncertain condition. A builder in that State made a contract for the erection of a church. In the course of the work he made the following changes from the plans and specification: 1. Instead of fifteen windows, he put in only thirteen. 2. Instead of one-and-one-half-inch flooring, he used one-and-one-fourth-inch. 3. Instead of two-inch doors, he put in doors one and three-fourths inches thick. 4. Instead of four posts under the gallery, he put two. 5. Instead of three-by-eight studding throughout, he used some two-by-eight studs.

There was some reason to suppose that the change in the number of windows was agreed to by the church authorities; but no order was given for the other changes. When the building was done, the church authorities refused to accept or pay for it. The contractor sued for the contract price, less the cost of making good the deficiencies, this being what is generally allowed by the Courts in those States where the stricter view of the entirety of building contracts is not held. The Supreme Court held, however, that, whereas, the law of Michigan is that a man should pay for that of which he has taken the benefit, even though it is not just what he contracted for, yet "a man cannot be compelled to take and use one 'thing, when he bargained for another, and declines to receive 'the substitute tendered.'"

The decision to which the Court referred as establishing the law in Michigan on the subject was one given in a case¹¹ where a man agreed to cut all the pine timber off an eighty-acre lot, pile it in a certain way on the bank of a creek, and remove the obstructions between the piles and the creek, for a certain price. He did not cut all the pine timber, and did not pile the logs in the manner agreed, or clear away properly the obstructions between the piles and the creek. Payment for the work was refused, on the ground that the contract had not been fulfilled. The plaintiff sued to recover on *quantum meruit*, claiming the contract price less what it would cost to complete the contract. The defendant introduced evidence to show that the work was not worth the contract price. This evidence was excluded by the Court below, which charged the jury that if there had been a partial performance of the contract, from which the defendant derived benefit, the plaintiff was entitled to recover the contract price, deducting any damages which the defendant had sustained by reason of non-performance. It will be observed that this is just what was claimed by the contractor's counsel in the later case; but the Supreme Court, in the earlier one, rejected this theory, holding that the charge to the jury in the court below and the exclusion of the evidence offered were both erroneous. The judges said, in their decision, "When a party fails to comply with an agreement, 'unless it is apportionable [or divisible], the rule is well settled that he cannot sue upon the agreement, or recover upon it at all. And under the strict common-law rule he 'was remediless. But the doctrine has now grown up, based upon equitable principles, that where anything has been done from which the other party has derived substantial benefit, and which he has appropriated, a recovery may be had upon

¹ Continued from No. 889, page 6.² Johnson vs. De Peyster, 50 N. Y. 666.³ Heckman vs. Pinkney, 81 N. Y. 211.⁴ Nolan vs. Whitney, 88 N. Y. 648.⁵ Moll vs. Foery, 43 Hun. 476.⁶ Pullman vs. Corning, 14 Barb. 174.⁷ Bixby vs. Williamson, 25 Minn. 481.⁸ Elliott vs. Caldwell, 43 Minn. 357.⁹ Denton vs. Atchison, 34 Kan. 438.¹⁰ Masters vs. Houck, 39 Mich. 431.¹¹ Allen vs. McKibbin, 5 Mich. 449.

"a *quantum meruit*, based on that benefit. And the basis of recovery is not the original contract, but a new implied agreement, deducible from the delivery and acceptance of some valuable service or thing. . . .

"Taking this as the basis of recovery, there certainly could be no good reason for allowing a party who is in default to recover in any case more than his work or goods may be worth; for that would allow him to speculate out of his own fraud or default; and he should not be allowed more than the same could be obtained for from any one else. To allow him the contract price for what is worth much less would not, in any sense, be allowing a *quantum meruit*."

The Court laid down its rule for such cases as follows:

"The defaulting plaintiff can in no case recover more than the contract price, and cannot recover that if his work is not reasonably worth it, or if, by paying it, the rest of the work will cost the defendant more than if the whole had been completed under the contract. The party in default can never gain by his default, and the other party can never be permitted to lose by it; and the price thus determined is the true amount recoverable on a *quantum meruit*."

In support of this view, the Court quoted an English decision, which says, that "In some cases, a special contract, not executed, may give rise to a claim in the nature of a *quantum meruit*; e. g., where a special contract has been made for goods, and goods sent, not according to the contract, are retained by the party. Then a claim for the value on *quantum valebant* may be supported; but then, from the circumstances, a new contract may be implied."

The report of the early Michigan case does not make it quite plain, but it seems as if the logs were cut on land of the defendant. If so, there is an essential difference between this and the question presented to the English court. In the latter, the defendant, on receiving goods differing from those which he had ordered, might have sent them back, and he would then owe the plaintiff nothing, while the plaintiff would owe him reimbursement for whatever damage might have been caused by the failure to deliver the goods ordered; but, having free choice as to what he should do, he chose to keep the goods sent him, and might reasonably be assumed to have, by that act, made, by implication, a new contract to pay for them. With the owner of the logs in Michigan, so far as can be judged from the report, the case was quite different. His trees had been cut down in a way which he did not wish, and had not contracted for; he could not have them replaced on their stumps, nor could he be expected to throw away his property. His only recourse was to take it and make the best of it; and his position was therefore quite unlike that of the buyer of goods, who is free, either to put himself back into the condition in which he was before the contract was made, or to take different goods in place of those agreed upon; and exactly similar to that of the owner of land on which a house has been built in violation of the contract, but who, not being able to abandon his land, or clear the building off it, has not that freedom of action which would seem to be, by the more logical reasoning of *Smith vs. Brady*, necessary to the creation of a new implied contract. In *Martin vs. Houck*, the Court seems to have interpreted the earlier decision according to the stricter view, but there are other cases in Michigan where some uncertainty appears to be shown.

In Pennsylvania, the law on this subject is laid down in the case of *Miller vs. Phillips*.¹ A contract between Miller & Phillips provided that Phillips and another should build a three-story brick house for Miller, for the sum of \$1,200; \$100 to be paid when the cellar was walled, and the rest when the house was finished. It was also agreed that the building should be executed agreeably to certain plans and specifications annexed to the contract, and should be finished by the following April. The contract was dated October 16. In February, the contractors had erected and roofed-in the building, but it was so badly constructed that it could with difficulty be made to sustain a roof; and the person employed to plaster it abandoned his work and refused to proceed, for fear that the walls would fall down. The work was then suspended, and on February 28 Miller gave written notice to the contractors that he intended to hold them to full and faithful compliance with the contract; that the building as erected was not a good and substantial building, nor as contemplated by the contract. He specified that the materials, or most of them, were bad, and the

house not built in a workmanlike manner; that it was so loosely and inartificially erected that it would be absolutely dangerous to occupy it. He said, further, that the contractors must understand that he did not intend to take any such building off their hands; but if the contract was not completed at the proper time, and in the proper manner, he would hold them responsible for all damages that he might suffer in consequence of its non-fulfilment.

On April 27 Miller was informed that the contractors were about to pull down a portion of the walls and rebuild them, and gave them the following notice:

MECHANICSBURG, 27th April, 1857.

MESSRS. PHILLIPS & KING:—

Gentlemen,— You appear determined to persist in going on with the house you commenced for me, under an article of the 16th of October, 1856, notwithstanding the constant and repeated notices that I have given you that I will not take it off your hands, and that I consider our contract at an end. You appear determined now to tear down part, and rebuild. I therefore again notify you that I have no contract with you for that purpose; that I consider our contract of the 16th of October, 1856, at an end on the 1st of April, 1857; that I will take no house that you may now build, fix or patch up off your hands; but that I will hold you responsible for damages for a non-compliance with your contract. You are also hereby notified to remove all materials belonging to you off my lot, as I want the immediate possession of it; otherwise I will be compelled to bring an action against you. Respectfully yours,

JOHN MILLER.

The contractors, notwithstanding this notice, went on, and pulled down and rebuilt two of the walls, including part of the foundation, and proceeded to finish the house, which was completed in July, 1857, and Miller appears to have taken possession and occupied it. They then brought suit on the contract, alleging that the house was now a good and substantial building, and finished according to the contract.

The witnesses for the contractors testified that the house was now "a good common job," while the witnesses for Miller said that it was built in an unsafe, unskilful and unworkmanlike manner. The plaintiffs were allowed to show that the weather during the construction of the building was very severe. The Court below gave judgment for the plaintiffs for \$750.

On appeal, the Supreme Court reversed the decision. It said: "The contract in this case was entire, and recovery must rest on performance, or not be allowed at all. If there be no performance within the time, the contract may be rescinded. If there be substantial performance, with only minor deficiencies, it may not be. If there be defective, negligent or worthless performance, it can only be placed in the category of non-performance; to be treated, as in fact it is, as no performance or part performance whatever. . . . After the time was out . . . Miller gave them notice not to proceed any farther, that on account of their worthless compliance with their contract he chose to rescind it, and he gave them an opportunity to place themselves *in statu quo*, by inviting them to remove their material from the premises. Under the facts disclosed by the evidence, he had a full right to do so, and it was necessary, if he wished to protect himself from being liable for what they might do thereafter. It was a case in which the undisputed evidence showed that there was no performance, not merely a case of imperfection, but of total deficiency, so far as they had gone, and the work must be done over again to be of any value as a dwelling-house. The employer was not bound in law or morals to give them another trial of their care and skill. Notwithstanding the notice, they proceeded with the work, and finished it, as already stated, about the first of July. Having disregarded their contract, and the notice of their employer, they proceeded, at their peril, to rebuild the house. And if the evidence on another trial shall make out that the work done between the 16th of October and the 1st of April was done in an unskilful and negligent manner, and it was not a substantial compliance with the contract, they will not be entitled to recover in this suit.

"We think that the principle of recovery laid down by the learned judge [of the court below]—that if it was a house inferior to what the contract required, but of value to the defendant, the plaintiffs might recover—was quite too liberal to insure full performance by contractors. A work, . . . though radically defective, might be esteemed of value to the employer, and if he should, upon this rule, be bound to pay for it, it would be a virtual substitution of one thing for another, a liability to pay for what was not contracted for, and a failure to obtain what was the object of the

¹ *Miller vs. Phillips*, 31 Penn. St. 218.

"stipulation. The law calls for honest, substantial performance, regardless of trifling defects, when passing upon that question, and the judgment of men will always determine what will be a sufficiently close compliance with the requirements of the stipulations to insure substantial justice.

"The unfavorable state of the weather," the Court said, "if it may be fairly presumed to have had the effect, against all due diligence of the party, to delay his operations, may, in many cases, be evidence; . . . but as the contractor takes the risk of the season when he undertakes to perform work at an unfavorable time it should be received with great caution, and only in aid of a clear equity on his part. He must have done his whole duty before it should be allowed to mitigate damages in his favor."

In Arkansas¹ the law has been stated as follows: "Where there is an entire contract for work, at a stipulated price for the whole, and part only is performed, there can be no recovery; but if accepted, or if the work necessarily enures to the defendant's benefit, the plaintiff should recover the contract price less the amount necessary to complete the work."

[To be continued.]

DAYLIGHT IN THE DWELLING-HOUSE.²



Eighteenth-Century Panel, in the *Musée des Arts décoratifs*, Paris. From *L'Art pour Tous*.

It has been said by some modern philosopher (a German, I think) that it is not necessary to be an architect in order to live in a house, intending thus to set forth that a given theory may be a good and useful framework for your ideas, although you did not yourself invent or develop it. The committee of your Association seem to countenance a variation of this aphorism by inviting a painter to read a paper to you this evening. They do not thereby imply that a painter can be an authority on architecture, but that he may, perhaps, know one or two things about the lighting of a house that are not usually learned in architects' offices, but which yet may have some practical importance. You architects lay yourselves out to be serviceable to all sorts and conditions of men—you build for "the butcher, the baker and the candlestick-maker," and you have it

in your power to make their lives pleasant and their home a "desired haven," or, on the other hand, to fill that refuge with "wailing and gnashing of teeth." No other profession in the world has such control over the destinies of men in general, but especially of painters, so I feel sure you will good-naturedly consider their wants before you put in your windows. We shall all readily admit that the first requisite for a dwelling-house in this climate is that it should keep out the weather; and I think it can easily be shown that the next essential quality is that it should let in the daylight (when there is any). Like most things, the letting-in of the daylight may be well done or badly done, and there are more ways of doing it badly than well, so that if left to chance it is likely to prove a failure.

I propose to explain in the first place what good lighting means, and how the windows should be placed so as to enable you to see things well inside the house. My next endeavor will be to show how the daylight, having been admitted, can be economized and utilized by reflection, and that the artistic treatment of the interior largely depends upon reflected light, and on the quality of the reflecting surfaces. You can have a very comfortable life in a tent. A tent, indeed, has charms for enterprising men, second only to those of a ship, the ideal home of the Englishman, whose estate covers the whole surface of the sea. A tent can be quite comfortable and safe, even in howling gales of wind or drifts of snow, and a considerable portion of mankind for generations have found tents quite good enough for common purposes—to eat, to sleep and to die in. But civilized man has a want which a tent cannot supply, viz, a place for the exhibition of his treasures, especially the treasure of beauty, for which stability, permanence, and good daylight are wanted. He also requires a base of operations for his enterprises, a museum for his archives and trophies, and, above all, for the convenient arrangement of his intellectual resources—for his books and his pictures. He may also require means for the entertainment of his neighbors and his children, and for seeing them to the best advantage.

If you can admit that a painter knows anything, you may be sure he knows how to light a picture so that its merits may be well seen, and I think it will not be difficult to convince you that the lighting of pictures is an excellent criterion of the lighting of the house—indeed, a very crucial test of it; but it is evident from our daily experience that many architects have never heard of such a principle, and will exclaim with certain disciples of old, "This is a hard saying. Who can hear it?"

Now, it is not practicable to build for a single individual; you must build also for his guests and for the public. Your client may be the most ignorant vestryman in the three kingdoms, but he will not owe you any thanks if you work down to his own personal level. Even if he devotes his whole life, say, to the choosing of bacon or cheese, he will still like to leave behind him when he dies such a house as shall have the approval of the more cultivated men of his day. Therefore you must provide for the housing of works of art, although they are not mentioned in the specification. When you have done your best the house is sure to have defects. Some of these will probably carry with them compensating advantages, and some can easily be lived down by a philosophical tenant, but defective lighting you will find very difficult to deal with, and in most cases incurable. . . .

The daylight under which pictures can be well seen may be either direct or reflected. If direct, it should not fall normal to the surface. It may come from the right or the left or from the top, but it must not come from behind the spectator, for two simple reasons. The first reason is that his own shadow will fall on the field of view, and the second that the surface of the picture will shine. So that the wall opposite the window is not a picture wall. The aspect of the window is not of much consequence, for although direct sunshine kills delicate color, and is not adapted to show anything well, it can generally be diffused sufficiently for most purposes by a blind of fine texture, and the architect is not much concerned, because the exigencies of the site and the plan will already have determined the aspect for him. The subject of skylights may be put aside for the moment, and windows taken to mean perpendicular openings in the wall. The placing of them should be decided simply on utilitarian grounds—that is to say, how the most wall-space can be well lighted.

External appearance need have no weight in the argument, for a man who cannot make any possible windows compose well in the elevation is not an artist at all, and therefore not an architect. I may even go so far as to say that the more irregularly, unsymmetrically, and arbitrarily they are placed the more scope there will be for developing a picturesque building. From an outside point of view, that is as far as the public are concerned, picturesqueness is the happiest attribute to be hoped for in a domestic building, since it will seldom be large enough to have any claim to sublimity or impressiveness. But there is this to be said on the other hand, that there is no worse form of affectation than the effort after picturesqueness for its own sake. In streets or terraces there is not much room for choice in the placing of the windows, so we generally find such houses comparatively well lighted. It is where the phantasy comes in, as in the country-house or the villa, where your architect is rampant, that you may expect to see some artistic flourishes, constructive mistakes, and incurable lighting.

I believe that if you design your house strictly from the inside, and on merely utilitarian principles, a good external effect is inevitable, or can only be missed through a singular degree of ignorance

¹ *Walworth vs. Finnegan*, 33 Ark. 751; See also, *Robinson vs. Snyder*, 25 Penn. St. 203.

² A paper read before the Architectural Association by Mr. John Brett, A. R. A., F. R. A. S., and published in the *Architect*.

or meanness. Of course, if you are ignorant of construction, or if you want to produce a more gorgeous appearance than you can honestly afford, there is no redemption for you; you are bound to fail, and to wish that you had never been born, for a mean building is usually destined to encumber the earth, and to disgrace your name for at least ninety-nine years.

Let us at once assume that your client or his heirs will have some beautiful things to grace the inside of their dwelling—and we should not overlook the circumstance that his daughters may be comprised in this category, so we must be careful to light properly this living sculpture, no less than the flat surfaces of the wall pictures. A happy expression on the human face is largely dependent on reflected light, which concerns surface treatment rather than construction, but the fundamental consideration and root of the whole art of lighting depends on having only one single aperture in the wall, so that the direct rays may all enter parallel, and not in conflicting directions. In artists' studios you will always find this rule carried out, and I will now attempt to explain the reason for it.

Let us suppose you have to draw a portrait. A single high-light on the head involves a shade in exact proportion to it, which you, as a draughtsman, can supply without any chance of error. The cast shadow likewise will have a known well-defined and inevitable relation to the shade. This simplicity of light and dark enables you easily to grasp the form, and to appreciate its undulations without uncertainty or confusion; whereas, if you have two sources of light allowing rays to enter in two different directions, not only will you get on your model two high-lights in inconvenient rivalry, but all your shades will be complicated and put out of their normal relation to their lights. The unity and simplicity of one shadow will be marred by the intrusion of another, and the result will be that your apprehension of the real undulations of the surface and the beauty dependent on them will be hindered, and considerable spaces of the surface will have no meaning for you, the beauty revealed by one ray of light being neutralized or blotted out by others proceeding in a different direction, so that the seeing is very considerably impaired, and the form shown at disadvantage.

This is one important argument in favor of establishing only one inlet of light in each room. But there is another argument even more important, because it affects not merely the form of an object but also its color and texture, in fact, it fundamentally affects your seeing power. The subjective effect of cross-lights is to diminish the pupil of your eye, thus curtailing absolutely your physical power of vision. Suppose, for instance, your room has two windows, one facing south and the other west, you will necessarily enter either on the north or the east side, since both the others are outside walls. Whichever door you enter by you will find a window light shining right in your face. You will encounter your visitor, say, in the middle of the room, exposed against the glare of the south window, he telling as a dark patch. This is not the chief mischief to which I am asking your attention, since the light from the west window may show his surface sufficiently well to be recognized. The main point is this: the light from the south window closes up the pupil of your eye so that it will admit only about half the quantity of light that you are capable of perceiving, and the effect upon you is equivalent to depriving you of one eye altogether, that is to say, your visual ability is crippled to the extent of one-half, so that, whilst you flattered yourself that with two windows your room would be twice as light as if it had only one, this advantage is neutralized by your being disabled from using half the available rays, to which must be added the further disadvantage that your visitor is exhibited under the most unfavorable conditions of light and shade.

In order to use all the seeing power that nature has provided you with, it is necessary that the light should reach your eye after having illuminated the object you want to look at, and, further, that the pupil of your eye should be encouraged to open to its full size by being shaded from the glare of direct rays. For these reasons the consulting physician always places himself in the shade and you in the light.

As all architectural structures have upright walls, such as are very convenient to look at, it is important that they should be well flooded with daylight, so as to show such pictures as you have; and next it is advisable to economize those walls as fields of beauty, and not carelessly cut them up by chasms for doors or fireplaces. Seeing that your house is not to be a mere shelter or casual-ward, but an intellectual preserve, it is worth while to relegate such interruptions of wall-space as far as practicable to the corners. I know that there is nothing more painful to the soul of the modern architect than a blank wall, and that sleep for him is impossible until he has broken through and destroyed that invaluable area of repose. So mad does it make him, that he has been known to build in unnecessary pilasters in order to divide it up. I will venture to remind him that the impressiveness of a building from the outside largely depends on great unbroken areas of wall, and that these may be well studied in mediæval fortresses, which are admitted to be the most picturesque structures existing in Europe. Take, for instance, the Castle of Ivrea, in Piedmont.

I think it may be taken as a general principle, that any architectural design that is so complete in itself as to forbid the intrusion of the subsidiary arts is not adapted for a dwelling-house. I know a man whose house was finished by Owen Jones. He is very fond of pictures, but has to keep them piled up in stacks for fear of spoiling his walls.

I have noticed that very young architects are instinctively aware of the value of accessories, since in their perspective drawings they do not hesitate to balance a poor, lop-sided composition by the introduction of a carriage-and-pair, nor to collect a vagrant assemblage of pinnacles into a group by the judicious insertion of a tree. No doubt, a good house ought to be adapted for an advancing civilization. We read that Old King Cole's wants were very limited: "He called for his pipe, he called for his glass, and he called for his fiddlers three"; but there is a young King Cole, now—a being to whom a sideboard, a billiard-table, and three fiddles do not comprise all the indoor requisites. He calls for his books, his pictures, and his sculptures three, and if you architects practically ignore or suppress these luxuries, as you have been doing of late years by your abuse of daylight and your ignorance of its application, you will drive your young client to let his new villa for a lodging-house, and to spend his time and cash in foreign travel.

A neighbor of mine is just now building a rather expensive house in the suburbs. His architect is evidently bent on doing something quite original, and amongst other peculiarities he has placed all the day-rooms under a deep veranda made of copper, calculated to keep out all the daylight. The poor client, I surmise, had no idea what the first consequence would be, viz, that he must straightway get rid of such works of art as he had and abjure every sort of beauty for the rest of his natural life. The unfortunate man will have very long gas bills.

We have arrived now at one well-defined and very important rule, which is that the daylight should be admitted to a room on one side only. Of course, every rule may have exceptions. On the east coast of England you will have noticed many little towers, built usually of wood, with an outlook in three directions, viz, up the coast, down the coast, and out to sea. These were wreckers' nests, where dwelt those whose livelihood depended on ships cast away upon that inhospitable coast and robbery of the unfortunate mariners. A short time ago I was spending a day at Greenwich Observatory, where the chief day-room had windows to the north and the west. This was one of those rare deviations from my rule that could easily be forgiven, for each window looked out on one of the most beautiful views in England. When you entered that room you never for a moment thought of what was within it, although good taste reigned. You walked straight to one of the windows and remained there. No one could find fault with the judgment of the architect. Here was an exceptional opportunity not to be passed by, even at the cost of an ill-lighted room, for the summer outlook on a paradise was worth some sacrifice. Having resolved on that sacrifice, he could easily afford to violate comfort, as he has done, by a French window; but it opens into an old English formal garden, with quaint apple and fig trees in it, such as would charm the soul of Mr. Reginald Blomfield. These are the only exceptions to the rule that occur to me. That part of a window which is most valuable is the top half, as it admits most light per square foot. The lower part only admits light reflected from the earth, and more or less colored; therefore roll-blinds from the top should never be allowed. Any other form of curtain is less mischievous, but a roll-blind should be fixed at the bottom.

In a well-lighted house the windows are carried right up to the cornice. Window-heads, whether traceried or lancet, may be admirable, but should be reserved for other buildings where people do not dwell. If you ask yourselves the question which rooms are pleasantest of all those you have known, I think only one answer can be given, and it will be this: those rooms are pleasantest in which work is done. Few would reply, "Those from which you have the best view." The man who would say so must be one whose home is sad, solitary, and unlovely, whose memories are the only beautiful visions on which his thoughts can linger. How often do you resort to your window with relish and turn away from it with reluctance? In your town experience, I may confidently reply, "Never." If you decide the question by the suffrage of all the fairly cultivated men and women you know, I think the vote would be given in favor of the painter's studio, which has either a skylight or a window too high to look out of. I believe few, even amongst women, would vote for the drawing-room. It does not usually fall to the lot of gentlefolks to spend much time in workshops, but if you have a wide experience you will cherish the remembrance of the days you have spent with the goldsmith, the blacksmith, or the carpenter; and none of those shops were lighted by architects, none of them had any outlook. If you would rather look out of your nest than into it, then must your life be sad indeed, and you had better get away into the wilderness or to the top of the Hindoo Koosh.

There is in the city of Timbuctoo a great town-house which illustrates nearly all the blunders that can arise from ignorance of lighting. The sheik is a man of the utmost good-nature and nobleness of soul, and takes pleasure in his splendid possessions just in proportion to the number of intelligent men who will share their enjoyment with him, so I surmise that some of you have been his guests. He has a collection of pictures of first-rate importance, but his ingenious architect has so contrived the interior that hardly any of them can be well seen. The value of some of the pictures is so great that a very few of them would cover the cost of the whole building, yet many of them are condemned to blush in dark corners in order that the architect should indulge his childish taste for symmetry. The principal suite of rooms face the south, and are all lighted in the orthodox way, viz, on their long sides. The opposite long walls do

not afford any good lighting, because, as I pointed out, your own shadow and the sheen on the pictures conspire to render them invisible; and the gigantic fireplaces occupy about a third of the area even of these walls. The only well-lighted spaces that the plan allowed were the short walls that stand north and south. These he has wantonly and ruthlessly wasted by opening a vast doorway in the middle of each of them big enough for the gate of a city, and so the design was finished.

I think many architects would be surprised if they knew how fine an effect is produced by entering a room at the corner instead of at the side. It must be very unusual, since I do not know more than two or three instances of it. Its charm depends on the varied angles under which the walls present themselves to the eye when you enter, as all of them are seen under oblique instead of parallel perspective, and the suggestion is conveyed that you should go on and prosecute your researches in the ramification of the structure. You are not confronted by a flat opposing partition right across the line of advance.

All deviations from mere symmetry are dear to the soul of the artist, because they give occasion for composition—that is to say, the creative faculty; and if there were no other reason for placing a window out of the centre of the wall, this would be sufficient, but as a matter of experience many reasons for doing so are not far to seek. There are instances in which one whole wall is filled-in with glass, and with excellent effect. There is one in a house very near my own, built by Mr. Waterhouse. It is the window of a fine staircase, the other whole walls of which are well lighted and well adapted for pictures, but, alas! the use of the stained-glass in the window has put this out of the question, and, instead of an intellectual feast of fine art, you are indulged with some admirable color and design in the glass itself, but the walls are wasted.

Let us now turn our attention to the second division of our subject, and determine how to deal with the daylight when we have let it in. This important question is too often shirked by the architect, and shuffled on to a scapegoat called the decorator. This pernicious person has the power of doing immense mischief at small expense, so he does it with no niggard hand.

For a concrete example, let us refer back to the great house in Timbuctoo. The picture-show begins at the dining-room, the walls of which are covered with a rich stamped leather of dark maroon and gold, affording a fine background both for pictures and guests. The decorative mind was just able to grasp this principle, and, knowing there was "nothing like leather," he carried it right up from floor to ceiling, absorbing that part of the wall which is too high above the spectator to be serviceable as background, and destroying its power of reflecting light, which is the only function it could have fulfilled, and would have fulfilled with admirable effect if its surface had been tinted with tempera or an ordinary wall-paper of a cream color. The ceiling, as usual, is cut up with mouldings and coloring of senseless pattern; but even if it were well designed he would surely be an odd sort of visitor who would turn away from Vandyke or Sir Joshua Reynolds to gaze at the ceiling. A few sixpenny buckets of whitewash expended on that ceiling would have redeemed the room, and proved that it belonged to an intelligent human being. Whitewash is a by-word with the modern aesthete, but it has its uses.

There are two different conditions under which light can be reflected. They are known in optics as whole light and scattered light. Whole light advances in one direction only. An ordinary plane mirror reflects whole light. The light called scattered light proceeds in all directions at once, and cannot be focussed by the eye so as to show images. Such is the light reflected from any granulated or dead surface, such as tempera, snow, or sand. If you require a polished surface to reflect light into a dark corner it will fail to do so unless it is placed at exactly the proper angle, whereas a scattering surface will be efficient at any angle. All surfaces that are not strictly required to do duty as backgrounds should have a scattering surface, so as to diffuse the illumination, and the lighter their color the more efficient they will be for this purpose.

In Italy, unfortunately, there is more or less good art displayed on the ceilings of the great houses. All men who have seen it will agree that it could not have been more foolishly misplaced or more effectually wasted. The greediness that asks for every surface to be made beautiful is not only a childish greed that wishes all bread were cake, but an immeasurably mischievous one, for there is in every room one surface that can only render good service when kept plain, and so enabled to set off to advantage the beautiful things that are more favorably placed for examination. That surface is the ceiling. The ceiling is an invaluable reflector and economizer of light, and that is the only thing it can do thoroughly well. If the economy of daylight by reflection is to be overlooked, all art may be banished from the dwelling, for few things are more painful than the spectacle of beauty wasted.

An excellent reflector of scattered light is a white linen cloth. It is well known that people look their best at a dinner-table, and I suppose it has been the practice in all civilized ages to serve the dinner on a "fair linen cloth." When the lamps are alight a strong reflection is sent up from the table-cloth into the faces of the guests, filling their shady recesses with a warm illumination, and giving them a more or less angelic appearance, or at all events, putting away the lowering and gloomy evidences of hunger and ill-temper.

Your architect will gladly provide you with good shelter where a

horde of menials can eat and sleep comfortably at your expense. Viollet-le-Duc is careful to go farther, and provide that you shall look out on the prettiest view, but he calmly assumes that you are sure not to have anything inside your house so well worth looking at as the houses or shrubs opposite, and the historical conclusion of the whole matter is that in the reign of Queen Victoria, in nine great houses out of ten, any kind of art is out of place, for the simple reason that the architects have misused the daylight and wasted the wall-space.

One word more has to be spoken as to the use of stained-glass, and it is this: If you wish to indulge in stained-glass you must make it your one and only form of color-decoration. You can have superb color in your window, but you take away its usefulness as a source of light, and make it an object to be looked at, and when you have looked at it your eye is unfitted to see any other color. Even the splendid tints of Eastern embroidery or carpets cannot stand the competition: white light is absolutely necessary for the display of their beauty.

Mr. Burne-Jones lately designed a beautiful picture, and Mr. Morris worked it in tapestry for the glory of the chapel of Exeter College. Some ingenious person has placed it on the same wall with a gorgeous stained-glass window, and opposite to another, so that none of its fine color can be seen. I need not enlarge on this subject. Once seen, that painful spectacle can never be blotted out of your memory. The color of your reflective surface is only one degree less important than the color of your window-glass itself.

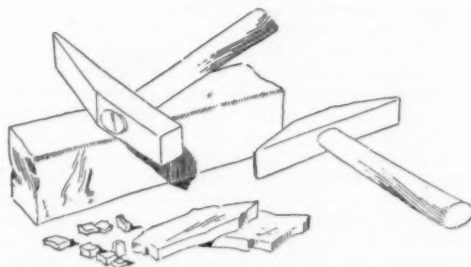
I once knew a physician who had the walls of his consulting-room painted of a strong uniform green. He was quite unaware of its professional advantages, and said he thought it restful to the eye. His decorator had told him so, having doubtless heard that green shades were used by people with weak eyes. As a matter of fact, all his patients appeared to have the cholera, and it had to be repainted.

A few years ago nearly every reception-room in London was papered with a dull sage-green—a sad emphasis to lay on the depressing climate we have to live in; but a good man and a friend of mine was responsible for it. I am afraid you will think I display an unreasoning animus against the architect, and that I have spoken rashly and at random as to his ignorance of the use of daylight. But that is not so.

There is an institution in which I lately offered to endow a prize for the best design for a house in which pictures could be well seen without a special gallery constructed for the purpose. The Council were pleased with the idea, but, scorning my modest 25% a year, made it into a handsome 200%. Two or three distinguished architects were appointed to judge the competition, and they actually awarded the prize to a design which afforded not one single well-lighted wall in the whole structure, and yet none of them were aware that they had done anything ridiculous.

There is a good deal to be said as to skylights in lighting the dwelling-house, but you have probably heard more than enough on the sacredness of the wall and the importance of one window. Allow me to suggest, in conclusion, that these matters are worthy of your most serious study.

MODERN MOSAIC.



—The Block and Hammers—

MOSAICS may be made of almost any material. It is, however, the purpose of this paper to deal only with those made from marble, tile, enamels or glass, and used for decorative purposes, for floors, walls, ceilings or panels.

Mosaics may be made directly in the cement at the place where they are to remain, or they may be prepared at the shop and afterwards set in place. Where the first method is employed, the surface to receive the mosaic is covered with a layer of mortar, on which the pattern or design desired is drawn by means of a pounce pattern. The bits of material of which the mosaic is made are then pressed into the soft mortar until the work is completed.

Since this process requires considerable skill and time, it is seldom used, though undoubtedly much better and more artistic effects can be produced by it than by the other and more common method. In these days, when "time is money" and everything must be done quickly and as cheaply as possible, a method somewhat more mechanical, requiring less-skilled workmen and admitting of quick work, is used.

Of course, the first thing required, no matter which method of

execution is used, is a colored sketch fixing the design, after which the full-size drawing, complete in outline and color, is made. Should this be a large piece of work, having portions repeated many times, pounce patterns, stencils or other mechanical means for duplicating the drawing and saving labor are employed.

Should the plan or design *not* be symmetrical on an axis, it is drawn in reverse; that is, the portion to be on the right hand when the mosaic is finished is on the left hand when the drawing is made. Lettering is drawn backwards, with the last letter on the left instead of on the right. Thus, "Cave Canem" would be drawn

maenC evaC

The reason for this will be apparent farther on.

This detail or working drawing is made on a stout manila paper, not too thick.

Accompanying the detail is a scale-drawing, which may be called the cutting-drawing or key. This is often made on tracing-linen for convenience, as, the cloth being transparent, the workman can then see the drawing either as representing the work when finished or the mosaic in the "reversed" position.

The working-drawing is spread out on a table or the floor, and upon the back of it is drawn at random a network of scrolls and interlacing lines. These do not assume any particular form, as they serve as guide lines only for matching the pieces in which the drawing is cut as the work proceeds.

In addition to these irregular lines, two straight lines at right angles to each other are drawn, representing the principal axes of the design. This done, the drawing is turned over, and lines dividing it into pieces about eighteen inches or two feet square are drawn. Similar lines are also drawn on the scale-tracing. These lines follow as far as possible the outlines of the design. The drawing is then cut on these divisions, and each piece numbered on the back, a corresponding number being placed in the respective square on the tracing.

The sections of the drawing are then given to the workmen, each taking one or more. On these sections the workmen paste, face (that is, the smoothest side) down, the tesserae of which the mosaic is made. The pattern is filled-in first, each workman usually setting but one color. When he has finished all the portions to be filled with the color he is using the section is handed to his neighbor, who lays in the next color while the first man begins a new section. This process is repeated from one man to another until all of the pattern or ornament is finished. Then the background is laid. This is often done by boys or apprentices. It is customary to make the first line of stones next the ornament follow its outline, but all the rest of the ground is laid in straight lines. When all sections are filled they are placed together, much as one sets together the toy "chopped-up pictures," on the floor or some convenient place, until the pattern is complete, but just the reverse of that which it will be when finished. Moreover, the side of the stones then seen is the side that will be set in the cement.

By slightly moistening with water, the color of the marbles is brought out so the workman is enabled to judge somewhat how the finished work will appear.

Certain corrections that it may be desirable to make are attended to now; then the parts are again separated, packed, and shipped to the place where the work is to be put up.

Mosaic is set in a mortar made of Portland cement, pure lime and sand. The lime is used to retard the "set" of the cement, that the mosaicist may make such changes as are necessary. When the work has been corrected and levelled it is flooded with pure lime, which fills up all the joints.

A certain amount of preparatory work is always done by the builder before the mosaicist begins his work at the building. This includes, for floors, a bed of concrete levelled off with cement from one-and-a-quarter to two inches below the finished floor level, and at least two inches above the top of the beams. For walls and ceilings a solid bed must be brought to within one inch of the finished mosaic level. If the ceiling is to be supported on the under side of wooden beams the bed is prepared by nailing furring-strips across the beams, and on these stretching wire-cloth lathing. Cement is spread over this, making a coating about one inch thick. Some mosaicists simply scratch this before applying the next coat; others drive in nails of wrought-iron having very broad, flat heads, which serve to hold the final coat of cement, one inch thick, in which the mosaic is set. If the ceiling is of brickwork the nails mentioned above are driven in the joints, and the final coat of cement only is used.

The cement having been prepared the sections of mosaic on the paper are again set together on some convenient floor-space. Two chalk lines are stretched a half or three-quarters of an inch above the cement to represent the axes of the work in hand. The central piece of mosaic is lifted by the workman and turned over, paper-side up, on the cement prepared for it. This is carefully adjusted until the lines drawn as axes upon the paper are directly beneath the cords stretched as guides above the work. Then the adjoining piece of mosaic is set on the cement. Here, in addition to making the outline of the edge of the part fit exactly the edge of its companion piece, care is taken to match the portions of the irregular lines which were drawn, as mentioned above, before the paper was cut in sections, thus insuring that the design is perfectly matched.

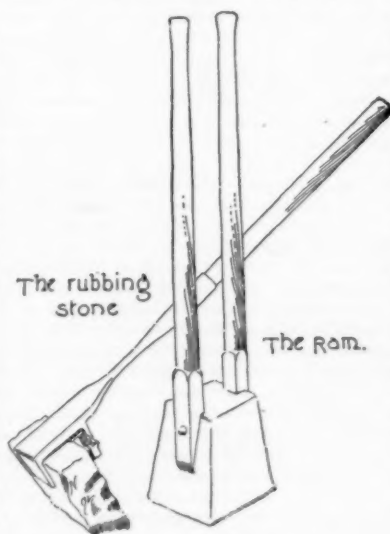
This process of joining one section after another in the wet cement continues until the entire mosaic is laid. Then it is beaten and rammed into the cement, after which a plentiful supply of water is used to soak off the paper so as to leave the mosaic exposed. This is now carefully examined, tesserae that are "off color" are picked out, lines corrected, or any other changes made that are thought necessary.

After thoroughly levelling by rolling with a heavy stone roller, the work is ready for polishing. This is accomplished by the use of a rubber made of sandstone fastened in a long handle. This is pushed back and forth over the mosaic, which is sprinkled from time to time with sand and water. Coarse sand is used first, then finer, then pumice and emery until the marble is of a smooth even surface. Mosaic is seldom polished more than to a dull smooth finish. The condition of the work immediately after rubbing is such that it is allowed to stand for several weeks before anything more is done to it. The marble is full of water, and salts from the mortar will soon show themselves by a beautiful white efflorescence. As soon, however, as the work has dried and cracked (for if the work is a large one several cracks will show themselves as the cement dries) it is carefully repaired and cleaned. It is then well soaked with raw linseed oil which is rubbed in, thus strongly bringing out the colors. Finally a wiping off with turpentine and wax gives a finish.

It is a difficult matter, if not almost impossible, to polish ceiling or wall mosaic after it is in place. For this reason a simpler and easier method of procedure is adopted. The tesserae to be used are laid irregularly in a thin bed of cement on the floor of the workshop. They are next rubbed and polished, but not oiled, the same as described above. When cleaned with water the work is broken up, and as the cement bed is very thin and fresh it is easily separated from the tesserae. They are then used to construct ceiling or wall designs, the smooth face of the marble being pasted against the paper. When set in place and the paper removed the work is smooth and even, requiring only such rubbing or cleaning as is easily done by hand. Many artists, however, prefer to have ceiling and walls of the rough, irregular surface produced by the sawed or broken edges of the tesserae.

Mosaics are principally made of marble and an opaque glass called enamel. Marbles are used for floors, hearths, or places which are likely to be walked upon; while enamels, sometimes improperly called glass-mosaics, are used for walls, ceilings, fireplace-facings, ornamented panels, pictures, and the like. The palette for marble mosaic is somewhat limited, even though many stones improperly called marbles are used to fill out the list of colors. Reds, yellows, and whites are easily had in several shades, the finest coming from Europe. But green can be obtained only in one or two varieties, including the Alps or Royal Green, which is expensive, and difficult to cut into cubes. Many stones that otherwise would be very useful have lines of fracture so irregular that they can hardly be cut for mosaic work.

The method of cutting the cubes is simple and often done by boys. The cutter sits astride a box or bench on the edge of which, in front of him, is placed a piece of soft iron about ten inches long and three inches square, called the block. On the floor in front of the bench



is a box to receive the cut stones. Lying about are the pieces of marble, usually the refuse from the marble yards, to be cut. In one hand is a hammer, weighing about two pounds, and having one or both ends chisel-shaped. These ends, the sharp ones, are tempered and set on the handle in a position similar to the blade of an adze. Taking a piece of marble the workman holds it against the iron in front of him, then, with a sharp quick blow with the edge of the hammer, the marble is cut in smaller and smaller pieces until the desired cube is formed. It appears so easy that an observer does not

realize until he tries the experiment how much skill this simple operation requires. Yet experienced boys will cut a quarter-inch stone held between thumb and finger much more quickly and surely than a novice would cut one four times that size.

Enamels for mosaic are made in discs about six or eight inches in diameter and three-eighths of an inch thick. All colors and shades are made so that in this class of work the artist is not at all limited in his color scheme. The discs are cut in cubes by means of a chisel-shaped tool, fastened edge up in the work bench, or on a stand

made especially for it. The disc is placed flat against this chisel and struck with the cutting-edge of a hammer, as was described above for marbles, the chisel replacing the "block." Enamels are really an opaque glass colored by various metals. They are much lighter, more brilliant than marble, and break with a clear sharp fracture.

In connection with them, so-called gold and silver enamels are used for backgrounds. The metal is a very thin leaf covered by a film of glass. This is accomplished by taking a disc of very thin clear glass, slightly concave. In the hollow a sheet of leaf metal is placed and both heated until the glass almost softens. Upon it is then poured the material for the back. This for gold is a dark-red glass, and for silver a green.

Enamel-mosaics, as before mentioned, are sometimes called glass-mosaics; but this leads to confusion, for there are mosaics made from transparent colored glass. These, however, are used only for wall-decoration and principally for ornamental panels. They may or may not be silvered or gilded on the back. The method of working is very much the same as with marble or enamels, except the glass is not pasted on the design but is laid upon a piece of clear sheet-glass placed over the drawing. The work is kept in position on this sheet of glass by Venice turpentine, which holds it sufficiently to prevent the pieces from becoming displaced. The cementing material for this class of work is plaster-of-Paris, or Keene's cement, which is poured upon the glass as it lies face down on the work-bench. When this has hardened, the panel is picked up, turned over, and the face cleaned: it is then ready for setting. If the design is a very large one, it is made in two or more slabs which are joined as the work is set in place, the operation of setting being similar to that of setting any slab of marble.

The cost of mosaic varies according to the design, the prices usually being quoted as so much per square foot. For marble mosaic the material is not very expensive, one square foot of mosaic requiring from seven to ten pounds of marble, which, for imported marbles, cost from five to ten cents per pound. It is considered cheaper to do a large piece of work having over one thousand feet than to do one having less. That is, taking the same design for which there is wanted but two hundred feet, it would cost more to execute, per foot, than if there were one thousand feet.

Hearth-stones and fireplace mosaics are made in iron frames so they may be set by any mason. They vary in price from thirty-five dollars up, according to design and size. Enamel-mosaics cost from fifty to one hundred per cent more than marble, and glass about the same as marble.

A word might be said in regard to the kind of drawing used for mosaic-work. If it is known that the mosaicist to execute the work is an artist, the best result will be obtained by giving him the working-drawing in charcoal, as this will allow freedom for the display of individuality and skill in carrying out of the work. Should, however, your drawing fall into less skilful hands, the result might be deplorable, owing to his not understanding or being able to follow the design. It is then best to give a pencil drawing carefully and clearly made, but not having a too fine and sharp line.

If the lines are sharp and very finely drawn the average workman will spend a great amount of time in cutting and squaring the stones to follow it exactly, thereby producing a result which is stiff and mechanical in appearance; whereas if the lines are broad and ragged, yet have the character and feeling called for by the design, the artisan cannot follow the lines mechanically and must use his mind somewhat in placing the stones, thus giving the work a more graceful and easy appearance.

ALVAN C. NYE.

THE EVOLUTION OF THE MODERN FIREPLACE.



Miserere in Choir of Amiens Cathedral. From *L'Art pour Tous*.

under which are set andirons or baskets, with fancy or artistic bakings relieved by facings of tiles.

The introduction of steam and hot-water heaters has done much to increase the use of wood mantels. When the fireplaces were used to heat the rooms in which they were situated the high temperature to which the mantels were subjected made it unsafe to use wood, and slate or marble was employed. The furnace made little change, for the registers from the hot-air ducts were often placed in the fireplaces (the smoke flues being closed) and the warm air strik-

ing the woodwork in the mantels caused it to crack; so slate and marble mantels were retained. In many cases fireplaces were discarded altogether, and at one time, especially in Philadelphia, there were no fireplaces put in the buildings, and those in the older houses were closed with a marble slab.

The use of steam and hot-water heaters emphasized the need for ventilation, and fireplaces, which all admit to be the best of ventilators, again came into use; upon this they became merely decorative vents, and the danger of using woodwork was no longer feared.

An occasional fire in the portable basket or from the burning of sticks on andirons, however, necessitated the placing of some inflammable material between the opening and the woodwork, and tiles were found to be most available.

And now comes the next step, the increase of tiling at the expense of the woodwork. Until recent years, good tiles were imported, and even now pattern or stamped tiles (of which the "Minton" is a well-known make) are still brought from England. But American tiles, at a cost scarcely one-half that of the imported, and made in colors both richer and more varied, soon came into common use. The imported tiles are, however, more durable and less likely to craze.

From the facing of tiles between the opening and the woodwork was suggested the lining of the fireplace with the same indestructible material. Hearths were laid not only in front of the mantel but were run into the fireplace, and the sides and back of the opening were covered with tiling. Here arose a new problem, for the walls of tiles, being unequally expanded and contracted by the varying heat of the fire, soon cracked and loosened, and finally came down. Mr. Edwin A. Jackson, who has spent so much study in the improvement of the fireplace, then conceived the idea of riveting each tile to an iron frame, which made their displacement impossible. The cost of this facing, however, made a cheaper lining necessary, and the iron backs now in use were substituted.

The facing within the woodwork was at first but four or six inches in width: now new and rich effects are sought, and the tile-work is becoming the important feature.

The setting of the facings, especially when the areas are large, is a big item in the cost of the fireplace. Not only does it require a great expenditure of time to set up a large facing of these small tiles (they are three inches long, and one, or one-and-one-half inches wide), but it requires skilled and rapid workmen. To secure a plane vertical surface, to have each tile flush with this surface, to have the same amount of plaster between each tile (scarcely more than a film), and to have all the joints break in straight and parallel lines is a result few workmen can attain. To householders of moderate circumstances (whose fireplaces we are considering) it becomes thus a question of a poor job or a small facing.

And here again the need suggested the remedy. The facings were set on the level, and then put in place. It was quite common for dealers to "slab" their tiles on marble, that they might be shown to customers. From this to the use of the iron frames already described was but a step, the saving in cost over the old fire linings being in the use of plaster rather than the rivets. Either these processes or modifications of these are used throughout the country in all cases where economy and good results are required.

The advantages in the use of frames are too obvious to need enlarging upon. In this method, the facing is laid out upon the floor, each piece fitted, and the frame welded into shape. The tiles are then placed face downward, the frame put in place, and thin plaster-of-Paris keys the piece. A facing is made in three pieces, and these are put together by the mason who sets them on the chimney breast.

And here we are up to date.

WILL WALTER JACKSON.

A PARTY-LINE QUARREL. — The *Christian Union* gives the following grateful variant upon the ordinary outcome of party-line quarrels: An acquaintance of the *Spectator*, about two years ago, built a house in New York. When the walls were up and the framing of the roof in place he was informed by the man who owned the adjoining property that the new house was six inches on his land. The *Spectator's* friend offered to pay very handsomely for the six inches that had been built upon by mistake. The owner of it would not sell. He said that his plans were all made for occupying the whole of his lot, and for no consideration whatever could he part with the six inches. The *Spectator's* friend could do nothing else than tear down his wall. This was done, and the wall moved back twelve instead of six inches. Then the owner of the neighboring property put up his house, and placed his wall just against that of the finished house. Of course this wall was now on the land of the *Spectator's* friend, who made no remonstrance until his neighbor had finished his house, furnished it, and moved in with his family. Then he called and informed the obdurate man of the fact. He was speechless with rage. The *Spectator's* friend then handed him a deed to the six inches, saying, "I did this just to make you realize how meanly you had acted toward me. I have no wish that you should be put to any expense. I make you a present of that six-inch strip." The *Spectator* is of opinion that if revenge is ever justifiable it was in this instance.

COMPARATIVE MUNICIPAL BUILDING LAWS. — XX.

[Note: — In these tables bracketed letters invariably refer to preceding passages in the same column.]

Sidewalks and Space Thereunder.

Boston: — All sidewalks to have fall towards curb-stone not to exceed $\frac{1}{2}$ " to 1". Sidewalk at curb not to be raised more than $\frac{1}{2}$ " above curb. House building or repairing may have enclosure on footway not exceeding $\frac{1}{2}$ " from building line. Special permit for building vault. (See "Cellars.")

Brooklyn: —

Charleston: —

Chicago: — *a.* When space is utilized under sidewalk, a sufficient stone wall shall be built to retain roadway; side, division and party walls shall be extended under sidewalk to such curb wall.

b. Sidewalk shall be of incombustible material entirely, supported by walls or iron beams and columns.

c. Openings for coal and light covered with prismatic lights and in iron frames, or with iron covers having rough surface.

d. No smooth surface on such cover; no plain surface of glass in sidewalk.

e. Permit, with details of construction, required, and owner of property to first give bond of \$5,000, approved by City Comptroller.

Cincinnati: — *(a), f.* No plain surface of glass or iron greater than 3" diameter placed in sidewalk.

Cleveland: — *(a); (f).*

Denver: — *g.* Vaults under sidewalks shall be securely covered with flagging or arched with hard brick, crown of arch at least 6" below established sidewalk grade.

h. No fixture shall project above or be sunk below grade of pavement. Outer line of vault must be at least 4" within inner line of curb, except in business streets; where there is no interference with lamp, tree or public works, they may be built with outer face of wall at inner face of curb.

i. Open areas to be well guarded with iron rails, and their openings perpendicular to street. Areas may be built covered with prismatic iron grating projecting not more than 4" from street line.

Detroit: —

District of Columbia: — *(g).* Openings in top of vault shall be at inner edge of extreme wall, have suitable covering, to be kept securely closed when not in use.

No fixture shall project above or be sunk below established grade of pavement, and outer wall of vault must be at least 6" within inner line of curb; except where there is no interference with lamp, tree or public work, by special permit, vault must be built with outer face of wall at inner face of curb.

No vault shall be placed within 3' of lamp or 4' of tree, nor so as to interfere with sewer, water or gas pipe, man-hole, tree or any public work.

Proper protection by metal or stone hand-rail shall be provided where steps are over areas or more than four in number, and for all platforms at areas.

Basement and cellar steps to be protected by railing like that for areas, with 4" openings or gates. (See "Cellars.")

Kansas City: — *Coal-hole or vault under sidewalk:* Outer wall next roadway to be of stone, not less than 2' average thickness, laid in good cement, sides at least 18" thick, of good, hard brick or stone inlaid in cement mortar, no part projecting beyond curb-stone; top formed of brick arch or arches turned in substantial manner, or by rough-hammered lime or sandstone at least 6" thick, supported on rolled I-beams of strength to carry 125 pounds per square foot, exclusive of weight of construction.

Opening in sidewalk over vault not more than 20" diameter, covered with rough iron plate. Entire construction subject to direction and supervision of Superintendent.

Coal-slide in sidewalk to have brick walls at least 8" thick, laid in cement mortar and covered as above.

k. Owner and tenant of estate responsible for safety, maintenance, and prompt repair of above constructions.

No boiler, steam-engine, furnace, steam-pipe, privy or water-closet constructed in coal-hole or vault, nor explosive substance or inflammable oil there stored.

Excavation of sidewalk requires special permit upon written application, and submission of plans and signature to agreement.

One-third width of sidewalk may be used for area to light basement, provided it is covered with prismatic lights in open frame. No open area permitted in sidewalk.

Louisville: — *(a); (b); (c).* No plain surface of glass in sidewalk.

l. Special permit required after approval of plans by Inspector.

Memphis: — *(a), (b)* or by piers. *(c).*

m. No plain surface of glass in sidewalk where any one glass is more than 4" square.

n. Areas covered with iron or other material shall have sufficient strength for load to which they will be subject. (See "Cellars.")

Milwaukee: — *(a).* Curb wall not less than 2' 6" thick at base, gradually tapering to not less than 18" at top, said wall not to be more than 8" deep below sidewalk grades. *(b); (c); (d); (f).*

No cellar door for mercantile or other establishment shall extend more than 3' into sidewalk, and shall be kept securely shut when not in use.

Stairways and steps may be built leading to basement, but not to extend into sidewalk more than 3' where it is not more than 12" wide, nor more than 3' 6" when sidewalk is wider; said stairways and steps to be protected by iron posts and rails approved by Inspector. Sidewalks must be placed at established grade.

Minneapolis: — *(a).* Curb wall to be stone not less than 2' thick.

(b) in accordance to the following schedule:

Distance in feet between centres.	Weight in pounds per linear foot.	Number and size of beam.	Span in feet.
4 feet centres.	18 pounds.	6 inch No. 10 heavy.	8 feet.
4 1/2 " "	18 " "	7 " " 9 light.	9 " "
5 " "	18 " "	7 " " 9 " "	10 " "
5 1/2 " "	22 " "	8 " " 8 " "	11 " "
6 " "	25 " "	8 " " 8 heavy.	12 " "
6 1/2 " "	35 " "	8 " " 8 " "	13 " "
7 " "	33 " "	9 " " 6 " "	14 " "
7 1/2 " "	45 " "	10 " " 5 " "	15 " "
8 " "	45 " "	10 " " 5 " "	16 " "
8 1/2 " "	45 " "	10 " " 5 " "	17 " "
9 " "	60 " "	12 " " 3 " "	18 " "
9 1/2 " "	60 " "	12 " " 3 " "	19 " "
10 " "	60 " "	12 " " 3 " "	20 " "

Arches turned between beams of not less than two courses of good, hard brick set on edge laid in cement. *(d).*

No stairway nor open area shall extend into sidewalk more than 4' on streets having walks 18' wide, nor more than 4' where they are 15' wide, nor more than 3' where they are less than 15' wide, nor at all where boulevard is less than 3'.

All such stairways and areas shall be properly protected by smooth iron or brass railings, and stairways at street corners rounded to radius not exceeding distance stair projects into sidewalk, measured at right angles to front or side of building.

No staircase shall be built leading from sidewalk or street to any story above first.

Nashville: —

Newark: —

New Orleans: — Banquette shall slope up $\frac{1}{2}$ " to 1" from established grade at curb.

New York: — *(a); (b)* or by piers. *(c); (m); (n).* (See "Cellars.")

Omaha: — *(a).* Curb wall of stone or hard brick. *(b); (c); (d); (f).*

Philadelphia: — It is not permitted, except around areas already excavated, to erect railing so as to reduce footway to less width than 16' where street is 100' wide; to less than 14' where street is 50'; to less than 12' where street is 60'; to less than 10' where street is 50'; or to less width than 8' on narrower streets. No cellar door, porch or steps shall project more than 4' into footway of street 50' wide, or a proportionate distance into narrower street.

Pittsburgh: — Before sidewalk is excavated for building vault, contractor or owner shall erect a good bridge the full width of lot not less than 6' wide nor more than 4' high, with steps at end for free use. (See "Cellars and Projections.")

Providence: — *Coal-holes and vaults under sidewalk:* Outer wall next roadway not less than 30" thick, of granite or building stone laid in cement; no part within 2' of top shall project beyond edge-stone. Sidewalks at least 12" thick, of hard brick or granite blocks, or 16" thick of building stone laid in cement-mortar. Top of vault to be good brick arch well turned, or by covering of rough-hammered granite at least 8" thick, or bluestone at least 6" thick, or iron and glass similar to Hyatt light, or with rough-surface iron.

Apertures in sidewalk not to exceed 18" diameter, covered with substantial iron plate with rough surface, or with iron and plate as above specified. *(h).* All above constructions subject to direction and supervision of Inspector or other appointee of Board of Aldermen. *(k).*

St. Louis: — Excavations under sidewalk must not extend beyond line 5' within and parallel to exterior line of curbing, nor beneath entrance to an alley.

Outer wall to be laid in best hydraulic cement-mortar, and pointed outside for at least 4' from top; wall not less than 2' thick for lower 12', and above tapering to 18" at top in all cases.

Detail plan and written specifications submitted preliminary to special permit from Board of Public Improvements.

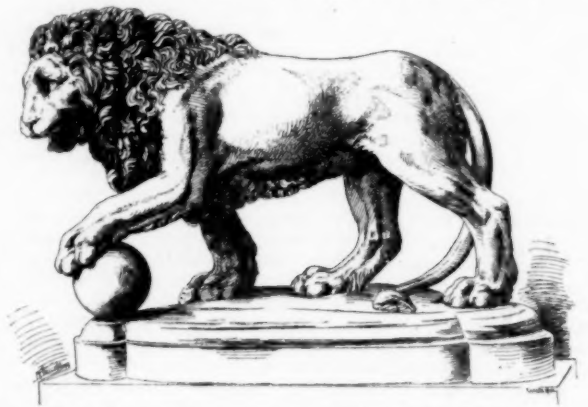
When sidewalk is excavated, person making excavation shall build strong bridge at least 5' wide, securely railed for convenient passage.

San Francisco: — *Bulkhead and area walls* constructed of brick or stone shall not be less than 12" thick for height not to exceed 4', and increased 4" in thickness for every 4' or part thereof additional in height; shall have footings not less than three-fourths thickness of wall, with proper provision for drainage. Mortar used for brickwork: hydraulic cement, four parts; quicklime, one part; sharp sand, two parts. Bulkhead or retaining-wall near street line, foundations shall not be less than 4' below street grade. Bulkhead and retaining-walls shall be constructed in conformity with rules given by Trautwine, or by authors now or hereafter used at United States Academy, West Point.

Wilmington: —

Compiled by HENRY A. PHILLIPS.

NOTES ON THE WEIGHT OF CROWDS. 1



Lion, by Flaminio Vacca: In the Loggia dei Lanzi, Florence. From *Der Formenschatz*.

A DENSE crowd is usually admitted to constitute the heaviest load that is likely to be carried by the floors of churches, theatres, public halls, grand-stands at race-courses and cricket-grounds, and in some cases by bridges. It is also the load under which failure is likely to lead to the most deplorable results, and should, therefore, be most carefully guarded against. Such being the case, it might naturally have been supposed that the weight of a crowd would have been most carefully ascertained, and most generally known and recognized by architects and engineers. Unfortunately, however, the contrary is the truth, and the designer requiring this vitally important information is perplexed and confused by the most contradictory statements appearing in the works of those who ought to be reliable authorities. Some of these statements are given in tabular form below:

WEIGHT OF CROWD IN LBS. PER SQ. FT.	AUTHORITY.
41	French practice, as quoted by Trautwine and Stoney.
70	Hatfield ("Transverse Strains," p. 80).
84	Mr. Page, engineer to Chelsea Bridge, London, quoted by Trautwine.
100	Maximum load on American highway bridges, according to Waddell's "General Specifications."
120	Mr. Nash, architect of Buckingham Palace, quoted by Trautwine, also Tredgold.
126	Experiment by Mr. W. N. Kernot, at Working Men's College, Melbourne.
143.1	Experiment by Professor W. C. Kernot at Melbourne University.
147.4	Experiment by Mr. B. B. Stoney ("On Stresses," p. 617).

No one can fail to be struck with the extraordinary variation shown in this table, the largest determination of the weight of an ordinary crowd exceeding the smallest in the ratio of nearly 4 to 1. The question then arises, How were these results obtained, and how

¹ Paper read by Professor Kernot before the Victorian Institute of Engineers, October 5, 1892.

is it that respectable authorities have so enormously over or under estimated the correct value?

We will proceed to consider them in detail. The first result is 41 pounds per square foot. This is given on the authority of Trautwine and Stoney, but how it was arrived at I am unable to discover. Trautwine himself puts little confidence in it, remarking that the lives of a dense crowd that once assembled on the Freiburg suspension-bridge, which was built according to this rule, were not very secure. I agree with him, and, further, have no hesitation in denouncing this rule as a most dangerous one, calculated sooner or later to lead to terrible accidents. The second result, 70 pounds, is given by Hatfield, a well-known American author, in a work of considerable pretensions entitled, "*Transverse Strains*," intended for the information of architects. The author discusses the question at length, occupying no less than eight pages of his book with the investigation, quoting numerous authorities and experiments made by himself and others. He commences by severely animadverting upon Tredgold, who in his work on carpentry gives 120 pounds as the true figure, and proceeds elaborately to determine from statistics and also by experiment the average weight of a human being. He then makes the statement that "it is known among military men that a body of infantry closely packed will occupy on the average a space measuring 15 inches by 20 inches = 300 square inches each." Applying this to a crowd, he allows two square feet of surface for each 10-stone man, giving a maximum result of seventy pounds per square foot. The whole investigation, the most elaborate I have met with, is a striking instance of how hopelessly a man may be misled who approaches a subject in a wrong way. To any ordinary reader the question appears to be most exhaustively and scientifically treated, and yet the result is utterly and dangerously in error. The statement as to the space occupied by soldiers quoted above has nothing to do with crowds. In the first case, the men are arranged in a definite order and at a distance sufficient to allow room for knapsacks, weapons, and other accoutrements; in the latter they are forced by violent pressure into closest contact, and are not kept apart by the above-mentioned articles. The fact is, as may easily be proved by any one who can command the services of a dozen persons, that an average man in a crowd occupies a space little, if any, exceeding one square foot. This is the vital fact that Mr. Hatfield is ignorant of, and, though being ignorant of it, he is led most fatally into error.

The third result, eighty-four pounds, is quoted from Trautwine, who says: "The engineers of the Chelsea Bridge, London, packed picked men on the platform of a weigh-bridge, with a result of eighty-four pounds per square foot." How the men were picked is not stated, but in view of our present knowledge of the subject we are justified in saying that if the experiment is not wholly apocryphal, they must have picked the lightest men in the whole of London.

The fourth result, 100 pounds, is given by Waddell, a leading American writer on "*Highway Bridges*," for structures of the highest class in densely populated places; while in country places, where a crowd is very unlikely to assemble, he allows as low a load as fifty pounds. This mode of regarding the subject raises the whole question of possible, but improbable, and certainly infrequent, loading, a question giving the widest field for discussion. I think that some concession may be made in the case of country bridges that would rather modify the safety factor than deliberately understate the maximum possible load. Further, the maximum value for city bridges (100 pounds) is decidedly too low.

The fifth result, 120 pounds per square foot, was originally given by Tredgold, and is severely commented upon by Hatfield as grossly overstated. It is really the first of those on our list worthy of consideration, and is certainly well within the truth. Trautwine further states in a foot-note that "Mr. Nash, architect of Buckingham Palace, wedged men as closely as they could possibly stand upon an area of twenty feet diameter, the last man being lowered from above. Result, 120 pounds per square foot." Here we appear to have the record of a carefully conducted experiment. Still, the result is such as to raise a doubt as to the physique of the men. They must have been rather undersized.

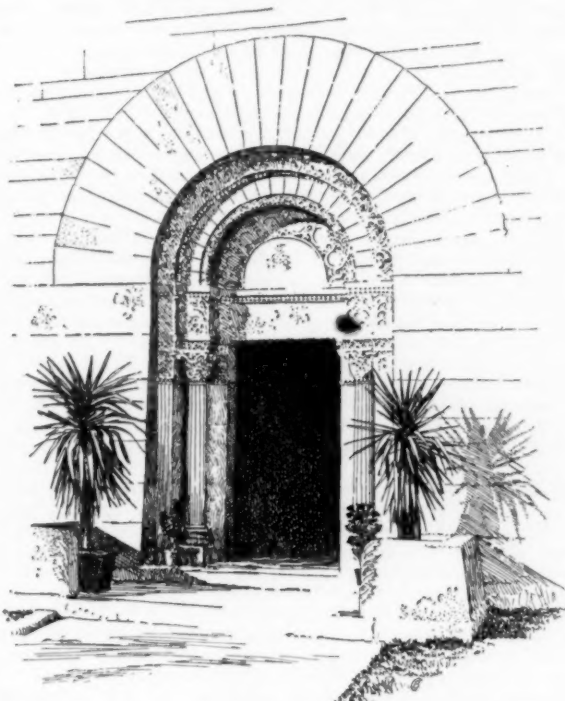
The sixth result, 126 pounds, was obtained by my brother, Mr. W. N. Kernot, at the Working Men's College recently. Thirteen male persons, of from twenty to twenty-five years of age and weighing altogether 1,761 pounds, were without difficulty, and with no unpleasant pressure, caused to occupy a space of only fourteen square feet. There was no "wedging" or lowering the last man by a crane from above. Had such expedients been adopted a considerably higher result would unquestionably have been adopted.

The seventh result, 143 pounds, was obtained by myself about a year and a half ago. A class of sixteen male students, of from eighteen to twenty-three years of age, were individually weighed on a new and very accurate weighing machine; their total weight was 2,455 pounds, or an average of 153.5 each. This is a high average, but the class was of unusually good physique, and their prowess at the tug-of-war, rowing, etc., was well known. This class I placed without the slightest difficulty in a lobby having a floor area of 18.23 square feet by careful measurement, giving 134.7 pounds per square foot. There were, however, considerable vacancies in the crowd, and all agreed that another man, had one been available, could have been put in, thus bringing the result to 143.1 pounds, as stated, which I am convinced is by no means an overstatement of the weight of a moderately dense crowd of strong, well-grown men.

The last result is the most conclusive and valuable of all, from the high reputation of the author, the large scale on which the experiment was tried, and the very complete way in which the result is recorded. I cannot do better than quote Mr. Stoney's own words from his admirable work on "*Stresses*." He says: "I packed fifty-eight Irish laborers, weighing 8,404 pounds, or 145 pounds per man, in the empty deckhouse of a ship 9 feet 6 inches by 6 feet = 57 square feet. This gives a load of 147.4 pounds, or a little more than one man per square foot; and some years later I placed seventy-three Irish laborers, weighing 10,948 pounds, or 150 pounds per man, into a wooden hut 9 feet 8 inches by 8 feet = 77 square feet; this gives a load of 142 pounds per square foot, or a little less than before. I have reason to suppose, however, that in this latter experiment two or three more men could have been squeezed into the hut, in which case the load per square foot would have been nearly the same as before."

In conclusion, I would desire to insist upon the fact that a dense crowd of well-grown men is proved by Stoney's experiments, corroborated by my own, to weigh from 140 to 150 pounds per square foot of surface covered, and that the results given in many standard works of from 40 to 100 pounds are seriously and dangerously understated.

EFFECT OF A FIRE ON A CHICAGO BUILDING OF FIRE-PROOF CONSTRUCTION.



Entrance to House of B. H. Warder, Esq., Washington, D. C. H. H. Richardson, Architect.

THE practical and severe fire-test of the nine-story fireproof building of the Chicago Athletic Club, which building is of steel-frame construction now so generally used, was noted in our issue of November 10, and, as was then stated, it successfully stood the test. This system of construction was fully described in *Engineering News* for December 5, 12 and 26, 1891, and January 2 and 9, 1892. We are indebted to Mr. E. S. Pike, chairman of the building-committee of the Chicago Athletic Association, for reports made upon the effects of the fire by Gen. Wm. Scoysmith and Mr. Isham Randolph, both well-known engineers. We give below the main facts of these reports, by which it will be seen that special care should be taken to securely attach the fireproof tiling, etc., to the columns and walls. The joint report just made by the engineers mentioned is as follows: "It is evident that the building when it took fire contained a very large quantity of combustible materials. There was a great deal of scaffolding and wood-finishing material distributed throughout the building, particularly in the gymnasium. If the building had been completed it would never have contained combustible material enough to have produced heat enough to have done any considerable injury to the building by burning. The heat of the fire that has occurred was evidently intense, as some of the steel beams, where they were not as yet fireproofed, are badly bent by expansion where their ends were confined.

"We have nowhere discovered that the metal portions of the building where the fireproofing held have been deformed or injured. And even where the fireproofing tile dropped off, from the burning out of the nailing strips which supported them, the columns seem to have supported their loads without bending, except two on the eighth floor, owing, no doubt, to the fact that the greatest heat had been

expended before these strips were so burnt away as to permit the tile covering to drop off. This building furnishes an assurance that was lacking before—that the metal parts of a building, if thoroughly protected by fireproofing properly put on, will safely withstand any ordinary conflagration if the quantity of combustible materials the building contains is not greatly in excess of that which enters into the construction of the building itself. In this instance we do not think that the fireproofing was properly bonded. We found the exterior walls and floors intact, and only the ornamental parts and the caps, sills and casings of the windows badly cracked and spalled. The integrity of the building does not seem to be impaired, and it may be made as good as new by replacing the parts injured."

Mr. Randolph also submitted the following notes made by him as the result of his examination of the building, the examination being made independently of that made by General SooySmith, but both being made at the same time:

"One very self-evident result of my investigations is the fact that better methods of bonding the fireproofing materials around the columns will have to be resorted to, if all the benefit of fireproofing is to be secured. No doubt exists in my mind that in the instance before us the fireproofing around the columns saved them from an utter collapse, by remaining in place until the fuel which fed the flames was wellnigh exhausted; but that was a fortunate accident, and not a result assured by the method of construction. It seems like a presumption upon the possible carelessness of others to venture the suggestion that before any work of reconstruction is permitted to be done that the debris should be entirely cleared away, so that a critical examination of every detail of the construction can be made and every part known to be safe before it is hidden by new construction.

"Ninth Floor.—But little damaged. Plastering peeled off walls of northwest corner room. Elevator shaft damaged.

"Eighth Floor.—Gutted east of the west 45 feet. In the front room the hollow tile fell away from the wrought-iron columns and they show signs of severe punishment. The east and west columns of the south row of three in the front room are decidedly out of vertical and the middle column badly warped.

"Seventh Floor.—Badly wrecked, but damage confined to burning-out of casements and peeling-off of plastering, and destruction of a few thin partitions. I note that in the northeast corner room, next to the stairway space, where the partition between the room and the stair hatchway had fallen one or more cans containing gasoline were found in good condition. The men who found them removed or secreted them very promptly.

"Sixth Floor.—Completely gutted of doors, windows, window-casings, and plastering. The I-beam supporting the wall between the northeast corner room and the stair area is bulged westward, and the wall above in a tottering condition. I-beams over light-areas badly warped and buckled.

"Fifth Floor.—Gallery, or race-track, around gymnasium, badly wrecked. Gymnasium, or fifth floor, gutted. The fireproofing of the columns failed completely, owing largely to the very faulty method of girding the column at intervals of about 3 feet, 4 inches with wood, separating the successive length of fireproofing tiles by material destructible by fire. These wooden girdings charred out and let the tiles fall, leaving the column with no protection from the heat. I fail to discover any warping or other deformation of these columns. None of the floors show any sign of weakness other than the falling away of an occasional tile from the ceilings.

"Fourth Floor.—The east front rooms on this floor escaped all damage from the fire, but are damaged by water. The rest of the floor suffered from fire, the woodwork being destroyed; but, so far as I can see, it is not impaired in point of stability. Below this floor I could see no fire-damage, and whatever damage there is, I judge it due to water.

"Michigan Ave. Front.—Above the gymnasium it is badly defaced, the stone used in its construction having scaled badly.

"Exterior Walls.—Apart from the damage noted above to the Michigan Avenue front, the main or exterior walls seem to be in excellent condition. No displacement or bulging is evident to the unaided eye. There seems no reason for questioning the integrity and strength of the building in its entirety after such renewals of damaged material as can readily be made have been effected."

Mr. Pike considers that, while a part of the fireproofing was ruined, it would not have been ruined had not the firemen thrown water on it when it was thoroughly heated, his claim being that the water was unnecessary, as the fire had done all the damage possible before the water was thrown on. The fireproofing, however, should be so put on as to stand the application of water without falling off, as it is most likely to be subjected to such treatment in case of fire. But it is not fair to lay the responsibility upon the firemen, whose first aim and duty is naturally to direct water into a burning building to extinguish the fire and prevent it from spreading, without considering what incidental damage it may do.—*Engineering News*.

INCENDIARISM THIRTY MILES AWAY.—How grave a danger electric wires involve is demonstrated by the discovery that a recent fire in Chenango County was caused by the crossing of an electric-light wire with a telephone wire thirty miles away. It is not at all surprising that the use of the trolley on Manhattan Island is to be speedily followed by an advance in insurance rates. The insurance men deal with facts, and recognize one fraught with danger as soon as they see it.—*N. Y. Tribune*.

UNPROFESSIONAL PRACTICES.



Cradle of the Duc de Bordeaux, in the Garde-Meuble, Paris. From *L'Art pour Tous*.

IN the so-called "learned" professions there are certain rules of professional etiquette observed, especially in the law; any interference with the acknowledged rights and duties of one solicitor or barrister by another is sternly rebuked; but amongst architects there appears to be a very lax conduct in dealings with one another. A code of professional ethics has been often talked about, but no definite rules have been framed binding on the whole profession, albeit without this general agreement very little can be accomplished in this direction; in fact, we scarcely can hope to look for any such amelioration till the profession of architecture becomes a registered body amenable to statutory powers. There are many practices which daily take place among architects and surveyors which are certainly wanting in professional conduct, or that can be said to be decorous. One of the commonest customs is that of toutting for work. In the provincial town, especially, the custom prevails to so large an extent that few people are inclined to take much notice of it. Mr. James Smith, a wealthy tradesman and town councillor, is about to build a residence, and as soon as the rumor is afloat he is besieged by several of the architects of the town, who are bent on the same errand of soliciting employment. Though it may be well known that the said Smith has consulted an architect who has even prepared designs, such information has no effect in the least on the canvassing proclivities of A, B, and C, who individually are eager to show their own superiority in professional skill, and even to vie with each other in detracting from the abilities of the other two, sometimes going so far as to blacken one another's character. Each sends a number of drawings of buildings, or goes so far as to prepare designs on approval, till Smith, wearied by these importunities, refuses to have any more interviews, or to see any more designs. We can understand a fair solicitation by sending a professional card when the contemplating building owner has not quite made up his mind; but the practice of toutting after an architect has been engaged is most reprehensible and quite unprofessional. We know of all kinds of things having been said and done by touts of this class to win the confidence of clients as well as committees. We are well aware that in the excitement and rivalry of competitions some excuse may be found, but the most unwarrantable assertions are made, which in no other profession would be tolerated. A, B, and C are competitors in the same town for a public building, whose designs are both well spoken of. A obtains an interview with one or more of the committee or town council, and does not scruple to misrepresent B, or to pick holes in his plan; while C goes so far as to print and circulate information to the detriment of the favored design. We cannot find fault with the competitor who, when he has the opportunity, points out the merits of his own design and criticises the plans of others; but this sort of thing may become something worse than bad

taste. When plans are under motto or number individual criticism cannot do any harm, and must do some good in drawing attention to points of arrangement; but these disparaging remarks are often carried beyond the bounds of fair criticism. We protest certainly against the habit of some members of the profession who seek to prejudice the minds of committee and assessor while the plans are being discussed, and we think that such conduct is deserving of severe censure. After a decision has been made every one has a right to say what he thinks of the design; it then becomes public property. Architectural competition has, indeed, furnished many glaring examples of the need for a standard of professional ethics or conduct in matters of this kind. The most unparliamentary tactics have been resorted to, such as disclosing names, the private circulation of mottoes, correspondence in local papers, publication of private circulars, and other methods of influencing the minds of committees and the public. These are methods that ought to disqualify any one who resorts to them. The practice of calling on members of committees in such cases is wanting in common respect and etiquette, and no individual who has any regard for his profession would condescend to do such a thing.

There are other practices which are equally culpable and unprofessional, and we notice a few of them here in the order they occur to us. It has been our unpleasant duty of late to record several instances of touting or advertising by so-called architects, in the remembrance of many readers. In those undignified announcements we often find the profession of architect associated with all kinds of trades and callings, such as those of builders, undertakers, auctioneers, house-agents, and even public-house businesses. These advertisements are not only detrimental to their authors but injurious to the profession, and cause it to be held in disrepute. The public at once draw inferences as to the status of those who thus tout, and unpleasant comparisons are made damaging to the profession. Quacks and mountebanks there always will be, but let the representative bodies of the profession try and stop a practice that has done incalculable harm to the calling.

A more reprehensible practice even than touting for business, because it involves the honorable conduct of architects, surveyors, and engineers, is that of interfering with or going between a brother architect and his client. We have known of cases where an architect or surveyor has been consulted or called in by a client who has disagreed with his own architect about granting certificates or the performance of work. We are not alluding to the case of a properly appointed arbitrator under the terms of a contract, but to an irregular invitation made by the client or the builder. In a properly drawn-up contract such an irregular interference would be impossible as that of the following case: An architect declines to give a certificate of completion, whereupon the builder consults Mr. Bouncer, who writes a letter to the official architect asking for a meeting at the building to measure up and value the work executed. Of course the latter can decline to meet the builder's nominee, who has the questionable taste to interfere with a brother-architect's work. It is an unwritten law in the ethics of every profession that it is unprofessional and wrong to accept any consultation in a work or business in which another member of the profession is employed without invitation to do so from the latter. Yet we sometimes find an architect accepting an offer to pass an adverse opinion on his brother-professional's work, or even going out of his way to give advice prejudicial to the appointed architect. The effect of such criticism or advice is to imply a doubt as to the ability of the architect or engineer engaged without giving the latter an opportunity of explaining his mode of operation or of rebutting the advice. It is very easy to criticise. One may say, "I should have made the plan so and so," or point out a better or safer mode of construction of a roof than that adopted, without knowing the circumstances of the actual requirements with which the architect has had to comply. How often we hear of the architect's sanitary arrangements questioned by another of the same cloth — perhaps a trivial question of trapping or of ventilation magnified into an importance it scarcely deserves. The architect in charge has a right to be first heard, and to accept or refuse the client's wish to call in an expert. If he refuses, the employer can only ask him to resign. No other course would be fair. The duty of the expert called in is clear — he should consult the architect before making any report.

A flagrant breach of professional etiquette is often noticed in the courts of law. Professional witnesses are found ready to give any evidence against their brother architect as to questions of fees or of negligence. This is the more glaring when their evidence is made to prejudice the jury, or by giving answers upon insufficient knowledge of the facts. Many other instances of unprofessional conduct might be cited, if only we had the space; but those we have instanced are enough to show to what extent unprofessional dealings are carried on. An American contemporary has prepared a short code of ethics to meet these practices. The rules given are good as far as they go, but the difficulty in the way is the general acceptance of them by the profession as a body. The main societies and their affiliated branches should certainly use their influence to prevent these practices amongst their members. The rules of membership generally include restrictions as to certain kinds of practice; but our experience is that the transgressors in these instances of malpractices are not entirely confined to non-members of professional societies. — *The Building News*.



THE ART-WORKERS' GUILD.

THE annual general meeting of the Art-Workers' Guild, Philadelphia, was held on December 30, in the studio of Mr. Alfred Godwin, 1325 Market Street, Philadelphia. The business, being chiefly the election of officers and committee for the ensuing year, resulted in the unanimous return of the following gentlemen to a second term of office:

Ed. Hazlehurst, *Master*; H. Bloomfield Bare, *Secretary*; Edward Lee Young, *Treasurer*; and for *Committee*, H. T. Cariss, P. Moran, W. A. Porter, V. E. Rondel, J. B. Sword and Henry Thouron.

Mr. C. M. Burns and Mr. Alfred Godwin, the elected auditors, reported favorably upon the treasurer's accounts and upon the financial position of the Guild.

The Master, Ed. Hazlehurst, proceeded to remind the members of the satisfactory progress that had been made notwithstanding the very short period since the formation of the Society, which had sprung out of a suggestion made in April, 1892, to a few members of the Philadelphia Art Club as to "the propriety of forming in Philadelphia a Guild of Art Workers, so that some united effort of practical work may be combined with sympathetic social intercourse, and an attempt be made to break up the isolated life of Art Craftsmen, and to uphold the spirit of Art Unity."

Those eligible for election in the Guild should be practical workers in any of the arts and crafts, as for instance architects, decorators, designers, engravers, etchers, glass-painters, goldsmiths, lithographers, metal-workers, modellers, mosaic-workers, painters, potters, process-printers, sculptors, wood-carvers, and representatives of other branches of art work.

Similar societies in England were started in London, 1884, and in Liverpool, 1888, and this is probably the first association of the kind in the United States.

The regular meetings of the Guild are held monthly during nine months of the year, with practical exhibitions of various crafts, and discussions thereon by the members. Intermediate meetings are also arranged for business of a less formal character.

The rules provide for two classes of members. "Guilsmen" are defined as 'Handicraftsmen and Designers in the Arts'; 'Associates' may be those persons whose nomination the Committee may approve; they shall have all the privileges of membership, except that of voting.

The Guild now numbers forty-four members, with other candidates on the list for election.

A dinner was given at the Art Club in May, at which the newly organized association entertained Mr. Walter Crane, a Past-Master of the London Art-Workers' Guild, then present in Philadelphia with an exhibition of his works in the gallery of the club. A more fitting inauguration could hardly have been made, for the great variety and high excellence of the works in this exhibition displayed at their best almost every branch of the arts and handicrafts in which this association is especially interested.

The growing needs of the Guild require that its meetings should be held in permanent rooms, and a committee appointed for the purpose report that suitable premises will, it is expected, be ready for occupancy within the next few weeks, when a syllabus of meetings for the year and the subjects offered for discussion and illustration by the members would be issued. Feeling reference was made by the Master to the death of Prof. F. Rondel, a member whose loss was deeply felt by all "on account of his many genial qualities, his right-minded counsels, and ever-active and generous support in all affairs touching the interests of his brother artists of every degree."

At the conclusion of the formal business the meeting partook of a more sociable character and indulged in the discussion of a variety of interesting subjects which suggested themes for illustration for many future evenings.

WORCESTER COUNTY SOCIETY OF CIVIL ENGINEERS.

The regular monthly meeting of the Worcester County Society of Civil Engineers was held at Wood & Rugg's office last week. The following officers were elected for the ensuing year:

President, A. J. Marble; *Vice-President*, E. W. Shedd; *Secretary*, W. E. Hasson; *Treasurer*, A. W. Woods; *Executive Committee*, G. E. Wetherbee, E. K. Hill, W. E. Mills.

A committee consisting of W. H. Moulton, F. L. Allen, and M. A. Boyden was appointed to arrange for the annual banquet, at which the Worcester Chapter of the American Institute of Architects will be asked to unite with them.

SKETCH CLUB OF NEW YORK. — MONTHLY MEETING.

The regular monthly meeting of the Sketch Club was held at the rooms of the Club, No. 47 West 42d Street, Saturday evening, January 7, 1893.

Forty-six members and four guests were present. Mr. John La Farge, the guest of the evening, gave the history of the decorations

of Trinity Church, Boston, which was very much enjoyed by all present.

At the conclusion of Mr. LaFarge's talk, the criticism on the Park Vase competition, by Mr. Frank Freeman, was read. Mr. B. Hustace Simonson received first mention, and Mr. Harason Bleckley second.

Fourteen drawings were submitted in the Hillside Tomb competition for January.

Mr. Charles F. Miller, of the J. M. Cornell Iron Works, has offered prizes to the Club of \$35 and \$15 for a design of a country house, plans to be furnished. Perspective outline drawing to be submitted only, designer can send in others if he chooses. Mr. Miller will make arrangements with the successful man to carry out the work.

Mr. James Ackerman offered a prize of a box of instruments valued at \$20 to the members of Mr. Kirby's pen-and-ink class for the best design and rendering of a stone panel.

The following class nights were announced for January:

Water-color, January 12, instructor, Clarence S. Luce; construction, January 20, instructor, Chas. T. Miller; pen-and-ink, January 27, instructor, Henry P. Kirby.

J. N. HUTCHINS,
Recording Secretary.



[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

HOUSE OF MRS. J. C. COONLEY, DIVISION STREET AND LAKE SHORE DRIVE, CHICAGO, ILL. MESSRS. POND & POND, ARCHITECTS, CHICAGO, ILL.

[Gelatin Print issued with the International and Imperial Editions only.]

COMPETITIVE DESIGN FOR THE MANHATTAN LIFE INSURANCE BUILDING, NEW YORK, N. Y. MR. STEPHEN D. HATCH, ARCHITECT, NEW YORK, N. Y.

COMPETITIVE DESIGN FOR THE BANK OF COMMERCE BUILDING, BUFFALO, N. Y. MESSRS. SHEPLEY, RUTAN & COOLIDGE, ARCHITECTS, BOSTON, MASS.

MARKET AND ARMORY, PORTSMOUTH, VA. MESSRS. CARPENTER & PEEBLES, ARCHITECTS, NORFOLK, VA.

PROPOSED NATIONAL GUARD ARMORY, SAN FRANCISCO, CAL. MESSRS. W. G. & C. R. MITCHELL, ARCHITECTS, SAN FRANCISCO, CAL.

ARMORY FOR THE SAVANNAH VOLUNTEER GUARDS, SAVANNAH, GA. MR. W. G. PRESTON, ARCHITECT, BOSTON, MASS.

PRESBYTERIAN CHURCH, MANSFIELD, PA. MR. W. J. EAST, ARCHITECT, PITTSBURGH, PA.

[Additional Illustrations in the International Edition.]

TOMB OF AUGUST BELMONT, NEWPORT, R. I. MR. R. M. HUNT, ARCHITECT, NEW YORK, N. Y.
[Gelatin Print.]

REAR VIEW OF THE SAME.
[Gelatin Print.]

TOMB OF ANN MARIA SMITH, NEWPORT, R. I. MR. STANFORD WHITE, ARCHITECT AND MR. LOUIS ST. GAUDENS, SCULPTOR.
[Gelatin Print.]

FOX OAK, BURHILL, NEAR WEYBRIDGE, ENG. MR. HALSEY RICARDO, ARCHITECT.

CHURCH OF S. MARIA DI CASTELLO, CORNETO. DRAWN BY MR. J. A. SLATER.

A CHURCH AT CORNETO. DRAWN BY MR. J. A. SLATER.

SUMMER RESIDENCE AT POINT LONSDALE. MR. ALAN C. WALKER, A. R. I. B. A., ARCHITECT, MELBOURNE, AUSTRALIA.

This house has been erected at Point Lonsdale, near the entrance to Port Phillip Bay. It commands a splendid view of what is known as the "Rip," where the cross currents of Bass Straits meet. The house contains sixteen rooms, exclusive of bath-rooms, stores, etc. A leading feature has been made of the main gable with two large bay-windows carried up the whole height. The veranda, 12 feet wide, has been carried round three sides, and there is an uninterrupted walk of 160 feet. At the angle it has been brought out to an octagon to form a piazza. The building is of wood, with slate roofs and shingles on the veranda roofs.

DESIGN FOR VILLAS, MOUNT MARTHA ESTATE. MR. ALAN C. WALKER, ARCHITECT.

The second design which we publish also suggests some of the characteristics, and especially the veranda, which are considered to be requisite for all classes of Australian residences.



[The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.]

THE SALTPETERING OF BRICKWORK.

NEW ORLEANS, December 9, 1892.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — I enclose translation of some extracts from a work, "*De l'Humidité dans les Constructions*," by G. Philippe, civil engineer, published by Ducher & Cie, Paris, 1882. I had, even previous to seeing the above book, formed the opinion that the growing dampness in old walls is formed by the deposition, or formation by deposits from the air, of saltpetre, which, travelling down in the porous wall until arrested by the usual waterproof damp-course, gradually accumulates in the wall, where, as it absorbs more moisture than the materials of the wall, the damp lime continually rises; thus laying open to question the effectiveness or even advisability of the damp-course (waterproof course for the prevention of dampness). If the saltpetre is deposited or formed as above, the above theory appears more reasonable than that a wall which has first lost, by evaporation or otherwise, its water of construction should subsequently "suck up" water from the ground, except in places where the surroundings are favorable to the absorption of deliquescent salts, which would then grow upward instead of building from above. I mentioned the subject to a prominent chemist here, who asserts that saltpetre can neither be deposited from the air, nor formed in the wall by deposits from the air, thus directly contradicting the authorities cited by Mr. G. Philippe.

As this is a question of vast importance to the profession, especially in damp and foggy climates, I would be pleased to have you submit the question to one or more chemists who may have turned their attention in that direction, as also to the profession at large.

If the saltpetre is received or formed from the air, a furred interior wall should not increase in dampness, as the moisture and its impurities are intercepted by the detached plastering, which, moreover, from following more readily the changes of temperature, would absorb less moisture. If, instead, the saltpetre comes from the ground, the dampness in the wall ought to grow, perhaps faster in a furred than in an unfurred wall; because the furring, by retarding the evaporation in the wall, might assist its rise. In the first case the waterproof course would assist the accumulation of saltpetre; in the other prevent it. As my doubts are but of recent date, I have to confess that I have not given this paragraph a close study, which can be made only as opportunity presents.

Yours truly, JAS. FRERET.

EXTRACTS FROM "*De l'Humidité dans les Constructions*." G. PHILIPPE, CIVIL ENGINEER, PARIS, 1882.

Page 24 and following:

"Saltpetre is found in the walls.

"Boussingault found one to three milligrams nitric acid per litre in rain-water; and in a thick fog in Paris, December 18, 1857, as much as ten milligrams per litre. Liebig has established the presence of nitrate of ammonia in storm rains. M. Cloez placed in a flask pieces of brick soaked in carbonate of potash and soda, on which he passed air; on continuing the experiment long enough, there were formed alkaline nitrates; if the brick was replaced by an inert body containing no oxidizable substance the result was negative.

"Kuhlman, chemist, has shown that, under the influence of a porous body, ammonia was oxidized in contact with air; the experiment was as follows: A flask contained ammonia which was heated over an alcohol lamp; the gas liberated was brought into another flask, with three mouths, into which a current of air was also driven rapidly. The mixture of gas and air passed by the third mouth on platinum moss slightly heated; very soon the moss became heated to a red, and from the extremity of the tube white vapors escaped, which condensation showed to be nitrate of ammonia.

"We will note that the same chemical combination is produced cold, provided the catalytic action of the porous body can take place; only it is produced slower. In nature, the ammonia is furnished by the fermentation of animal and vegetable detritus, urines, fecal matters, etc.; the building materials constitute the porous body; the acid in the nascent state seizes on the lime or potash contained in the clays, and saltpetre is formed."

A DISPUTED COMMISSION.

BOSTON, December 21, 1892.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Dear Sirs, — Will you greatly oblige us by giving us an opinion on the following case?

Some time ago a building-committee in a distant State advertised the terms of a competition for a parish church. The limit of cost was fixed at a certain sum. The award was given to this firm and one of the members visited the place in order to become acquainted with the conditions, etc. While there he was informed that the

committee had grave doubts as to the possibility of executing the accepted plans for the sum specified. They, therefore, furnished him with the names of certain local builders. He consulted with these men and obtained from them approximate figures which ranged from ten thousand dollars more than the limit to over double the sum. These figures he submitted to the committee, and on the basis of these figures we were ordered to prepare the working-drawings, our representative stating that if the lowest approximate figure was reliable it would be perfectly possible to reduce the cost of the plans by ten thousand dollars.

We immediately began work on the plans, and had them well under way when, becoming convinced that the final estimates could only be largely in excess of the lowest approximate figure, we, with the consent of the committee, still further modified the plans, and prepared an entirely new set at our own expense.

These plans and specifications (1/4 scale, complete) were sent to the committee, who obtained figures on them, the result being that the lowest received was practically the same as the highest approximate.

The committee write back refusing to honor our bill, for 2 1/2 per cent sent with the plans and specifications; declare that the plans are of no use to them; that they hold them subject to our order, and demand indemnity for the loss they have sustained.

Subsequently they modify their demands, and propose that we make another full set of plans and specifications which they would accept, provided they are satisfactory to the committee and could be built within the specified sum. This we decline to do, and in reply are informed that the committee has decided to employ other architects, and will under no circumstances pay us anything for the very large amount of work already done.

It is our impression that, as approximate estimates were obtained from men selected by the committee, and that as we were authorized to prepare plans on the basis of their figures, the responsibility rests with the committee, but we should very much like your opinion of the matter.

Very truly yours, ARCHITECTS.

[We could hardly answer this question, and we imagine a jury would be equally unable to answer it, without a long and exhaustive investigation and all the circumstances attending the making of approximate estimates. If the drawings submitted for approximate estimate were so clear that a builder of reasonable skill ought not to make any serious mistake as to what they meant, and if the estimates were made for the committee, by the committee's men, and without interference from the architects, we should say that the committee ought to stand strictly by its action; but if the committee has any good reason to suppose that it, or its men, were misled by the architects, or their drawings, it might fairly consider itself discharged from its obligation; and a jury, from the fact that the actual estimates were more than a hundred per cent higher than the approximate ones, would probably jump to the conclusion that there must have been some deception on the part of the architects. The controversy is certainly a most unfortunate one. According to the statement in the letter, which appears to put the case very fairly, there does not seem to have been any bad faith on either side, and the whole trouble has the air of being due to a series of misunderstandings. The late H. H. Richardson used to say that he would never allow a set of plans to leave his office unless he went with them; and we cannot help thinking that if one of the architects had accompanied the working-drawings the trouble might have been avoided. — EDS. AMERICAN ARCHITECT.]

THE LATE ADRIAN WORTHINGTON SMITH.

PHILADELPHIA, PA., December 30, 1892.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—Adrian W. Smith, architect, died on the 18th inst., at the age of thirty-two years.

His efforts were principally in the direction of ecclesiastical works, and though cut off in the beginning of his career his influence as an earnest advocate of radical methods of advancing the practice of architecture to higher ethical planes will long be felt by his fellow-practitioners.

Very respectfully yours,

AMOS J. BOYDEN, Secretary, pro tem,
Philadelphia Chapter, A. I. A.

DEFECTIVE FLUES.

NEW YORK, January 9, 1893.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—It is with much interest we note your comments on "Defective Flues," and it being a subject of so great importance to us, we cannot but offer a few suggestions.

First, Avoid all sharp turns or any runs that bring the flue below an angle of sixty degrees. Probably in nine cases out of ten, where trouble has arisen from open joints, it can be traced to one of these turns. A straight wall can be so easily laid, and there is so little cause for mortar to fall from joints, that safety is insured even with careless mason-work. And on the contrary, the most careful work will not always insure safety in a horizontal run. And not only are these turns dangerous, but they are disastrous to the draught of the fireplace. For every reason, they should be avoided.

Second, Do not place woodwork on the chimney-breast or near the fireplace. To do this is in direct violation of the building laws—yet it is repeatedly called for by unthinking architects. Plaster should be put directly on the brickwork. Besides adding to the safety, this materially increases the amount of heat radiated from the flue into the room through which the flue passes.

It is surprising how many careless mistakes builders will make;

and architects are not sufficiently strict on the construction of fire-places. Even where drawings and specifications show the desired construction, and mistakes are cautioned against, we have found timbers run directly under the fireplace, and in some cases directly over. It is not uncommon to find a staircase supported by the chimney-breast, and wood mantels come in close contact with the fire.

Inasmuch as a fireplace is at once the most attractive and, if poorly constructed, the most dangerous feature of a house, would it not pay architects to make a special study of this subject?

We are very truly yours,

EDWIN A. JACKSON & BRO.

NOTES AND CLIPPINGS

THE RIGHT TO MAINTAIN PRIVATE BURIAL-GROUNDS.—Several interesting cases as to burial-places have been decided within a month or two. The Second Division of the Court of Appeals, just before it disbanded, discussed the rights of the parties to the suit in a case where a farm was sold with a reservation of the right of burial in a private burying-ground on the farm and a right-of-way to the graveyard. Subsequent holders of the farm endeavored to destroy the burial-place by removing the stones and levelling the ground. The Court held that the descendants of those who originally sold the farm could prevent the destruction of the burying-place, as the right to bury includes the right to protect the graves from those who would destroy them. A case in a Philadelphia local court was a few months ago was to the effect that a widower who desired to remove the dead body of his wife from one cemetery to another could not be prevented from doing so unless good cause was shown. The wife was a Roman Catholic, and, at the request of her relatives, was first buried in a Roman Catholic cemetery. Afterward, the husband desired to remove the body to a Protestant cemetery, but the sister of the wife endeavored to prevent the change. The courts would not interfere. A correspondent of the *London Justice of the Peace* writes to know whether the taking of flowers from the grave on which they had been placed and transferring them to another grave without the consent of the person who owned the flowers is larceny. The law journal, referring to a previous decision, holds that the transfer would be larceny. It was held in a recent case in the Pennsylvania Supreme Court that the right to sepulture in a cemetery is not such an interest in the land as will support an action in ejectment. — *N. Y. Tribune*.

NINE HOURS' WORK FOR TEN HOURS' PAY.—"Have you ever realized?" said a business man yesterday, "what nine hours' work for ten hours' pay means?" Supposing a factory employ fifty hands at two dollars a day, which is twenty dollars an hour for ten hours' work. Therefore, nine hours' work means giving each man twenty cents a day, the fifty men ten dollars a day, or three thousand dollars for the three hundred working days in a year. But that is not all. In order to turn out the same amount of output, the manufacturer must make up this one hour by hiring one new man for every nine men, or five new men for the fifty men. The five new men, at two dollars a day, cost ten dollars a day, or another three thousand dollars for the three hundred working days, a total of six thousand dollars, or twelve per cent extra cost on an output of fifty thousand dollars. If the manufacturer does not make up the lost time by hiring the new men his pay-roll has, nevertheless, increased three thousand dollars a year, while his output will have decreased ten per cent because of the one hour in every ten granted the men. It means again additional space or additional machinery for the five new men, which represents another three per cent, at least. Thus you see that the demand for ten hours' pay for nine hours' work, which looks so innocent on its face, amounts to fifteen per cent extra expense on the cost of the goods, when the average profit is only about six per cent. Therefore, except this is made a universal rule everywhere, any manufacturer granting it will simply be wiped out by the competition, having this fifteen per cent disadvantage." — *Cincinnati Commercial Gazette*.

PESTILENTIAL CHURCHES.—The Church of St. Mary Woolnoth, which stands out conspicuously at the King-William-Street corner of Lombard Street, London, was closed ten months ago, and it is clear from the statements of the rector that the step was not premature. It has been his unhappy lot to be often startled in the course of his services by a loud yet muffled sound, evidently issuing from the vaults under the church. As these vaults are now "hermetically sealed," the phenomenon may well have excited the imaginations of timid members of the congregation. Mr. Brooke, however, recognized the noises only too well. They were caused by the falling of leaden coffins, sometimes from a height of ten or twelve feet, in consequence of the mouldering away of the coffins of oak and elm on which they had been piled. It would be well if the evils of this relic of our barbarous system of intramural interment had ended here. Unfortunately the process of "hermetically sealing," according to Mr. Brooke's evidence before the Consistory Court of St. Paul's Cathedral, has been anything but "hermetical." Mr. Brooke declares that for years nearly every official has died from the effects, direct or indirect, of the unendurable smell. Mr. Arthur Statham, the council representing the parish, stated that 1,681 adults and 422 children had been deposited in this horrible receptacle between 1700 and 1832. In the latter year, according to Mr. Statham, the vault was closed for burials; but these burials in St. Mary Woolnoth, if burials they can be called, were continued for at least twelve years after the latter date. The question appears now to resolve itself into that of apportioning the cost of removing these human remains. Clearly a decision should be come to without a moment's unnecessary delay. — *London Daily News*.

RUINS OF THE TEMPLE OF BAAL.—There rises a huge wall, seventy-five feet high, enclosing a square court, of which the side is 470 feet long. Part of the wall, having fallen into ruins, has been rebuilt from the ancient materials, but the whole of the north side, with its beautiful pilasters, is perfect. As the visitors enter the court they stand still in astonishment at the extraordinary sight which meets their eyes, for here, crowded within those four walls, is the native village of Tadmor. It was natural enough for the Arabs to build their mud huts within these ready-made fortifications, but the impression produced by such a village in such a place is indescribably strange. The temple, so to speak, is eaten out at the core, and little but the shell remains. But here and there a fluted Corinthian column or group of columns, with entablature still perfect, rises in stately grace far over the wretched huts, the rich, creamy color of the limestone and the beautiful mouldings of the capitals contrasting with the clear blue of the cloudless sky. The best view of the whole is to be obtained from the roof of the naos, which, once beautiful, and adorned with sculpture, is now all battered and defaced, and has been metamorphosed into a squalid little mosque. To describe the view from that roof were indeed a hopeless task. High into the clear blue air and the golden sunshine rise the stately columns; crowded and jumbled and heaped together below, untouched by the gladdening sunbeams, unrefreshed by the pure, free air, lie all the squalor and wretchedness of an Arab mud-hut village. — *Blackwood's Magazine*.

SAFETY-VALVES ON RANGE-BOILERS.—In reference to our recent article on range-boiler explosions, Mr. Kinnell, of the firm of C. P. Kinnell & Co., writes to us in a very dictatorial style to the effect that we have misled the public by stating that safety-valves on boilers will afford security from explosion, and denying that they will; his reason being that in the case of a red-hot empty boiler into which water is introduced the pressure of steam is too sudden and violent to allow time for a safety-valve to act. On inquiry, we find that our correspondent is unable to cite any case within his own knowledge in which a boiler furnished with a safety-valve did burst under those circumstances. While he has no negative evidence to offer, we have the positive evidence of a case in which the boiler had been empty for a considerable part of the twenty-four hours, without the knowledge of the inmates of the house, and when the water came in at the usual supply time the explosion of steam was so violent that part of the brass-work of the safety-valve was crumbled as if by a blow from a heavy hammer; but the boiler was entirely uninjured. The safety-valve was a spring one; we do not recommend these as the best, as there is always a possible element of going wrong in a spring; the dead-weight safety-valve is the most reliable, as that is merely lifting a weight, and there is nothing to get out of order. In deference to our correspondent's criticism, we will go so far as to say that the fact of a safety-valve (even not of the best kind) having saved a boiler once under this extreme stress is not a proof that it will always do so, and that it is much better to avoid all the causes of danger, and have a safety-valve as well, which can do no harm, and is an important additional precaution. We may also add that it is possible to make an important improvement in safety-valves of this description for range-boilers. They are at present made with much the same diameter of steamway as is allowed for relieving a boiler from gradually-increasing pressure, whereas the range-boiler safety-valve is required especially to provide against a very sudden expansion, and its steamway should, as it appears to us, be increased accordingly—a point which we commend to the attention of the makers of range-boiler safety-valves. In the meantime, the undoubted fact that one of the existing pattern of spring safety-valves, with these disadvantages, has saved life in averting a serious explosion, is a reason for thinking that it will do so again, though we admit that it may not be safe to assert positively that it will always do so. — *The Builder*.

BUILDERS NOT BOUND BY TRADE-UNION RULES.—Builders will be glad to learn that, in the opinion of a London magistrate, they are not bound by the rules of a trade-union. There is nothing new in the decision; but of late years, as the power of workmen has grown, it has been too readily assumed that customs and rules were as much to be respected as clauses, in an Act of Parliament. The case we refer to was heard at the Highgate Police-Court on Monday. A bricklayer who came to work without his tools was dismissed on his return from breakfast. He claimed an additional hour's pay, on the ground that the rules of the Operative Bricklayers of the London district asserted that masters should pay one hour's time over and above what had been occupied at the termination of engagements. It appeared also that the rules received the approval of the Builders' Association. But there was nothing to show that the builder had agreed to accept the rules of the Bricklayers' Society or that he was bound by any act of the Builders' Association. He was not a member of the latter and was not an admirer of the former society. In such a case the magistrate had only one course before him, which was to dismiss the summons with costs. The result, it is to be hoped, will be considered seriously by the workmen of the building trades. If they will not satisfy employers about the quality and quantity of their work they can be dismissed, notwithstanding all the rules which societies can lay down on paper. Strikes may be got up in reprisal for expecting a fair hour's work for fair wages, but as those contests are likely to arise if all profits are made over to the men there is not much use in guarding against them. — *The Architect*.

WOOL FOR A BRIDGE FOUNDATION.—When the National pike bridge west of Richmond was in process of construction the workmen at the west side of Whitewater River dug down to find a solid foundation. They struck a great and seemingly bottomless bed of quicksand. Vainly they labored to find a safe resting-place for the foundation. Finally the civil engineer and the contractor struck on a novel expedient to overcome the difficulty. They sent men all through the country to buy wool. They purchased nearly all of that commodity in this and

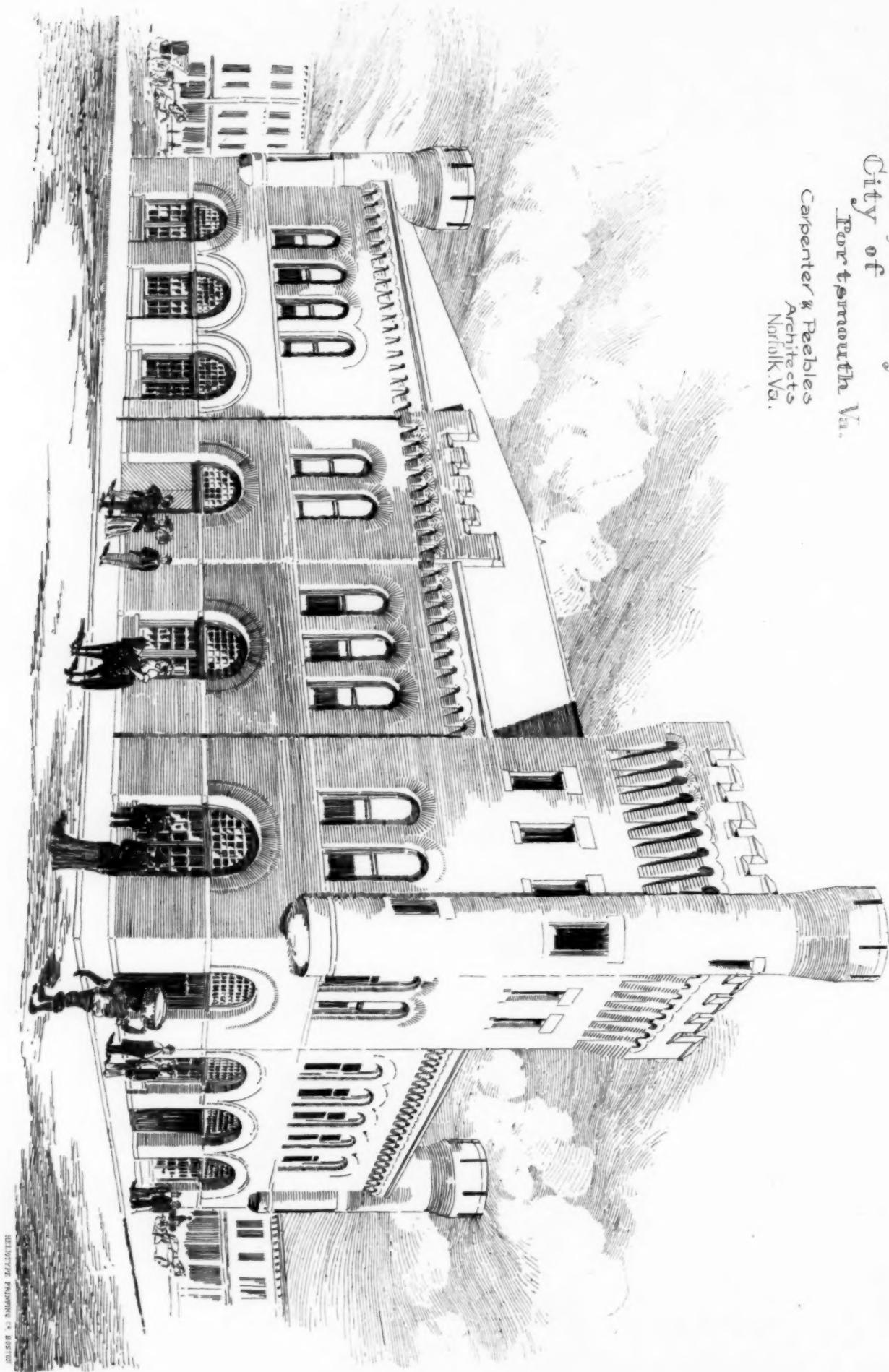
adjacent counties, and the primitive woollen mills were compelled to pay high prices in order to procure anything to work on. This wool, unwashed, burrs and all, was delivered here on wagons of all sorts. It came piled high on beds constructed for the purpose, and all was tumbled into the hole intended for the foundation. As pressure was applied it sank some distance into the sand, but finally it would sink no farther. At last, on this woolly foundation, the rocks were laid, and to-day the western abutment of the old National bridge rests on a bed of compressed wool. — *The Indianapolis Sentinel*.

MME. DIEULAFOY AND THE ACADEMIE.—It is rumored here that Mme. Dieulafoy, the courageous woman who accompanied her husband on his dangerous expedition to Persia, will shortly be put up for a fauteuil in the "Académie des Inscriptions et Belles Lettres." Mme. Dieulafoy more than deserves this distinction, for, not content with displaying the greatest pluck under the most trying circumstances, and with helping and seconding her husband throughout his difficult undertaking, she published on her return to France a clever and interesting book relating her experiences during this daring journey, which, from a scientific point of view, can be numbered among the standard works of travel. — *N. Y. Tribune*.

TRADE SURVEYS

THE tabulated statements of railroad earnings for the past year show an increase of about nine per cent in earnings over the preceding year. Statements from clearing-house associations show about the same increase in the total volume of business transacted. The figures of imports and exports show a corresponding increase in trade, and, so far as the unreported business of the country is concerned, its volume seems to also have exceeded that of 1891 considerably. Everywhere we see evidences of an expansion of business. At the same time, there is universal complaint as to the character of the business done. Competition has been asserting itself at every point; margins have been narrowed down to limits which render it difficult to make both ends meet; but, despite these facts, an enormous amount of projecting has been done. Enterprising men, capitalists and investors have, for six months past, evidently been making preparations for an expected reaction. If the reaction comes, there will be more and greater opportunities for investment, more margin, and a general increase in industrial and commercial activity. The banking interests are doing their best to make preparations for the increased demands that will be made upon them for funds. Several remedial measures have been proposed in Congress, but none of them are of anything more than a patch-work nature; no comprehensive system has been suggested—perhaps because the time for one has not yet arrived. Whether the banking interests will be able to meet all of the demands which will be made upon them is doubtful, according to many authorities. There is an enormous volume of money now in savings-banks, trust concerns, building and loan associations, and on deposit in various ways, awaiting opportunities for employment, and much of this money will seek the first favorable opportunity for use. At present, it is wiser to let it remain idle than to jeopardize it in investment when there is no absolute need for its activity. This is the opinion held by experts in money matters. Throughout the country the industries are pretty busily engaged, and that there will be an increase in activity is apparent in many quarters. The strongest evidence of this lies in the fact—which deserves special reference—viz, that stocks of all kinds of crude and finished material are now at a rather low point. In fact, some industrial authorities think that the manufacturing interests are making a mistake in checking production so quickly upon the slightest occasion. The danger of the situation now is, in their opinion, that there may be such a sudden stimulus imparted to demand as to create speculative values. Admitting the very worst, it might be said that this result might, in a short time, create an advance of ten per cent in prices where the legitimate advance would not exceed five per cent. But it must be remembered that all through the industries the capacity is much greater than has ever yet been fully employed. Our textile mills are able to produce more than they have ever had a demand for; the same is true in the heavier industries, also in the multitude of shops and factories. At the same time, the far-seeing business men of the country are now beginning to recognize the possibility of danger, due to too great caution in the matter of production. Larger stocks, they think, ought to be carried; and this policy will soon obtain. Advances from agricultural sections point to the possibility of higher prices for cereals and cereal products within the next six months. The farmers are dissatisfied with the returns of the past two years in dollars and cents, although not in bushels and tons. A great deal of new territory will be reduced to cultivation this year. There is a steady outflow of population to the agricultural districts newly opened, and this outflow will continue through the year. According to reports gathered from State authorities, land is increasing in value in nearly all of the Western States, especially along or near lines of railroad. It was recently given out that some 6,000 miles of railroad will be built this year, most of it in regions dependent upon agricultural activity. Reports received from the coal-mining interests indicate that there will be an increase of about ten per cent in production this year. Several very large investments in coal lands have recently been made, notably one by the Vanderbilts in the New River region of West Virginia. A great deal of capital will enter industrial channels this year; such investments will have the preference over most others. Industrial organizations are also multiplying, and a great many will take shape before the opening of spring. It is also stated by New York stock authorities that a large number of new properties will be listed on the Stock Exchange. It is announced by those conversant with the inward and outward flow of American securities to and from Europe that the inward flow will be checked this year, which fact it is of importance to note. If this be true, it means a discontinuance of the drain of gold and an increasing demand for American securities of all kinds. Not until such a demand develops will there be genuine activity on this side. European buyers of our securities have been more or less apprehensive ever since the Baring failure. This timidity in regard to American securities is without cause, and not creditable to the intelligence of European capitalists. But the more intelligent investors now recognize the fact that American securities, in the long run, are the best, even though we should indulge in financial measures not considered wise from the foreign standpoint.

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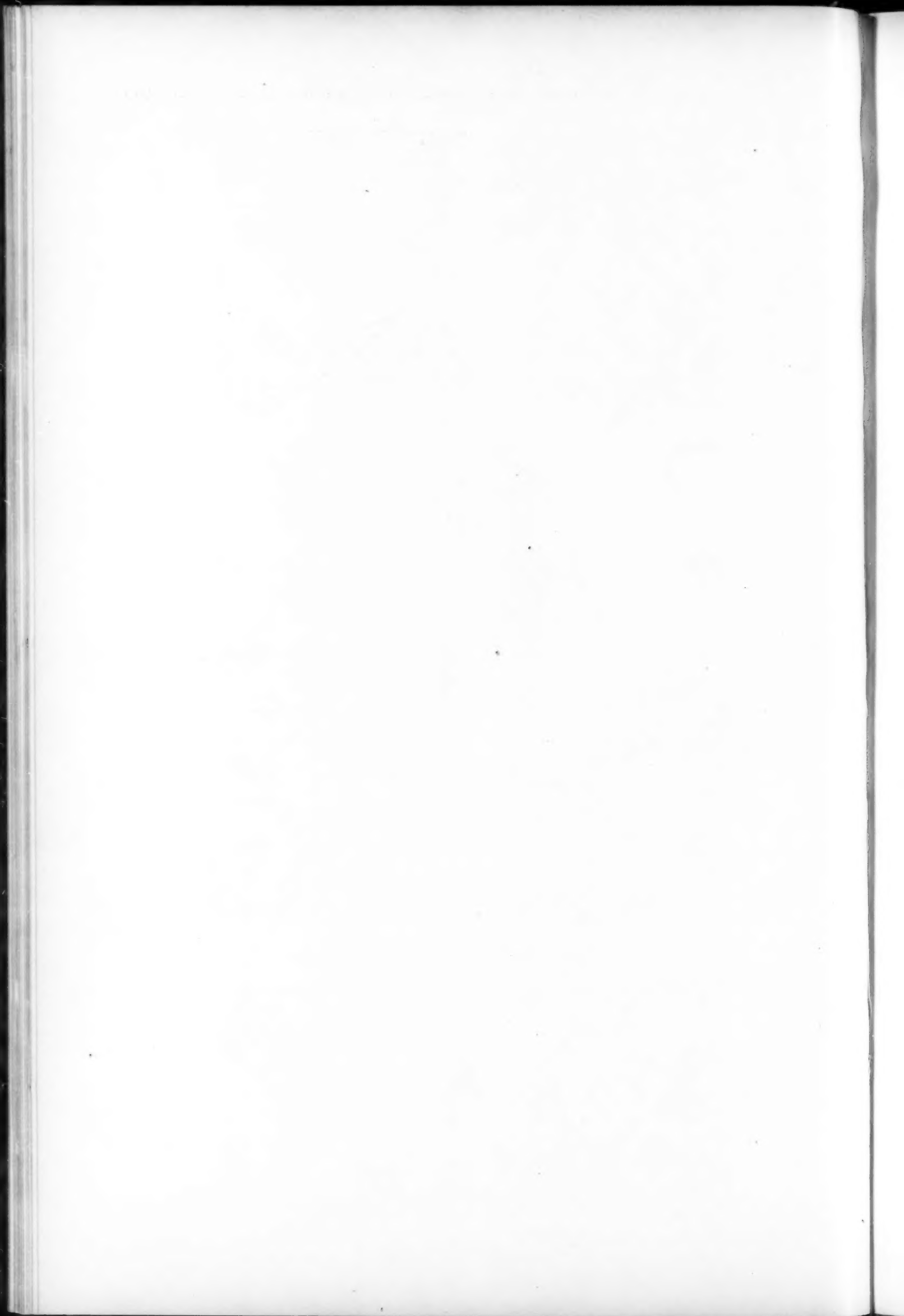
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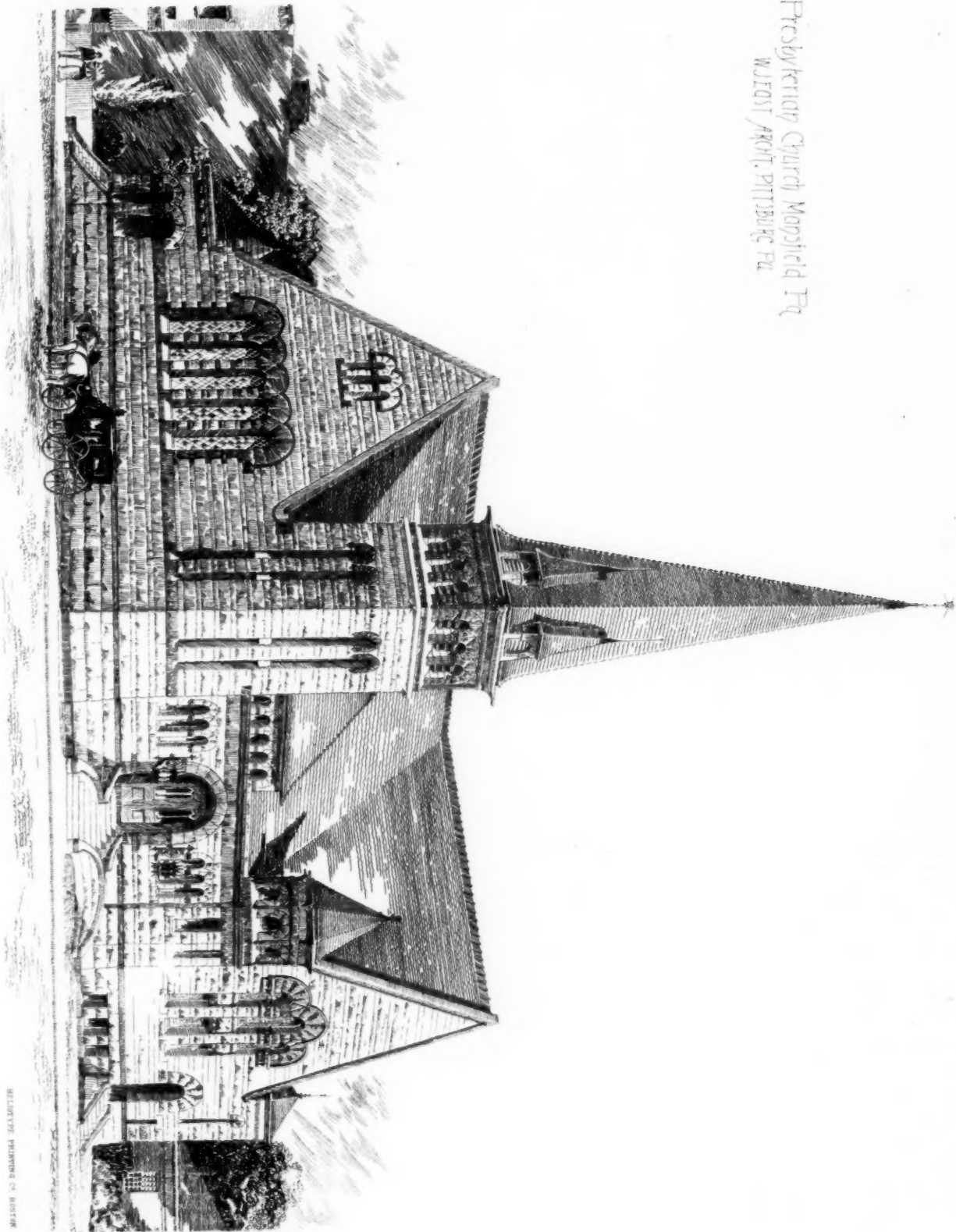
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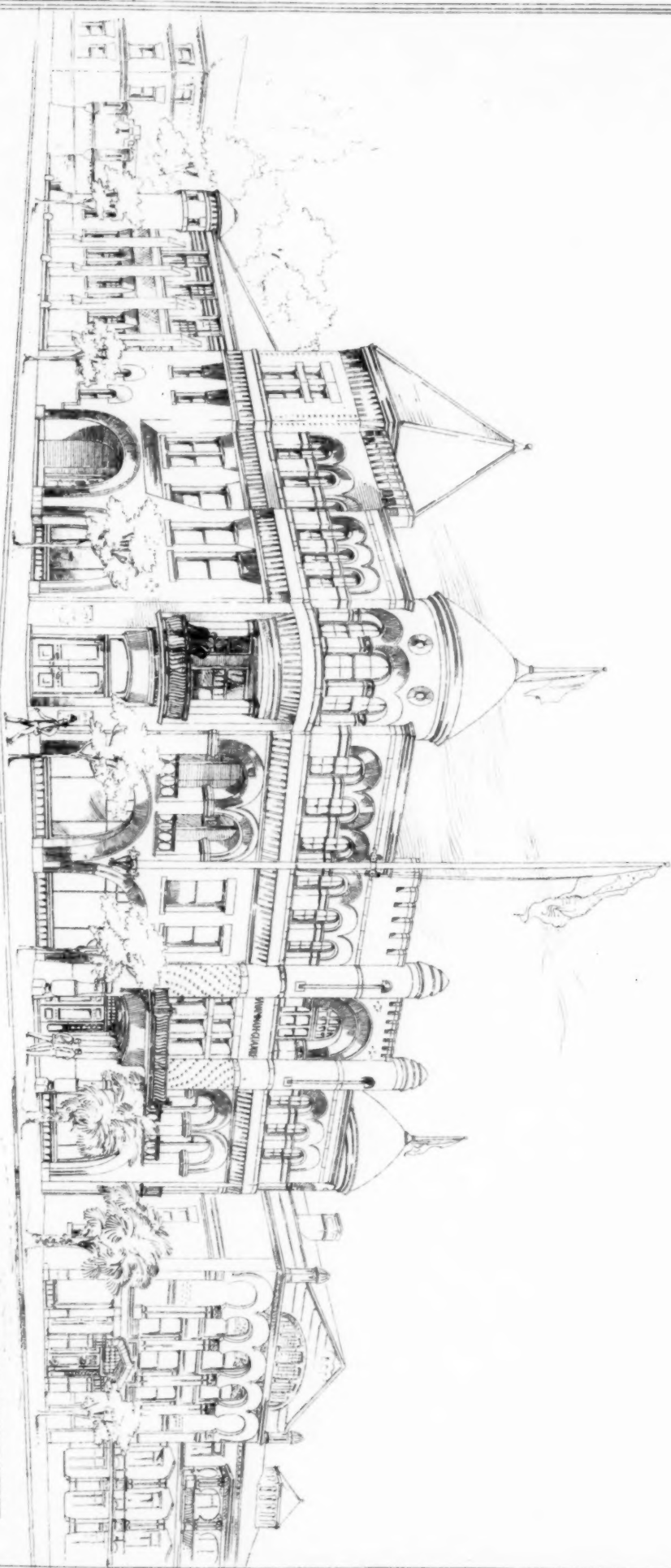




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